

REPORT
OF THE
MINISTER OF AGRICULTURE
FOR THE
DOMINION OF CANADA
FOR THE YEAR ENDED MARCH 31
1916

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1916

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REPORT

OF THE

MINISTER OF AGRICULTURE

1915-16

To Field Marshal His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and of Strathearn, K.G., K.T., K.P., etc., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR ROYAL HIGHNESS:

I have the honour to submit to Your Royal Highness a report of the Department of Agriculture for the fiscal year ended March 31, 1916.

I. GENERAL REMARKS.

Under the respective headings of the branches and divisions of this department will be found a synopsis of proceedings during the past year. The work in each branch has been efficiently carried on.

There has been no legislation affecting the department during this period.

By an Order in Council of date the 27th of April, 1915, the regulations under "The Animal Contagious Diseases Act," approved under date the 30th of November, 1909, and amendments thereto, were further amended by adding the following section:—

"Sec. 88½. The feeding of swine upon garbage or swill, either raw or cooked, obtained elsewhere than on the premises where fed, is prohibited, unless special permission in writing is first obtained from the Veterinary Director General.

"This amendment shall not come into force until three months after publication thereof in the *Canada Gazette*."

Vide Canada Gazette, Vol. xlviii, p. 3416.

This amendment came into force in the month of September, 1915.

By Order in Council approved under date the 18th day of August, 1915, the regulations under the Destructive Insect and Pest Act established by Order in

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Council under date the 4th November, 1914, were amended by inserting the following words after the eleventh line thereof:—

“Truro N.S., and Digby, N.S., for nursery stock destined to points in the province of Nova Scotia only; from March 15th to May 15th, and from October 7th to December 7th.”

Vide Canada Gazette, vol. xlix, p. 577.

In virtue of section 2 of “The Seed Control Act,” the following Order in Council was passed on the 30th September, 1915:—

Whereas, it is deemed desirable, in the execution of the powers conferred by section 2 of the Seed Control Act that special grades of grain should be established exclusively for seed purposes without affecting, of course, the commercial grades fixed under the authority of the Canada Grain Act;

And whereas, the primary purpose of providing a special grade of grain that may be suitable for seed is to create a substantial supply of Red Fife and Marquis wheat, white oats and six-rowed barley that is clean, of superior quality and reasonably pure as to variety or type of grain, so that such supply of grain may conveniently be made available to farmers, seed merchants or grain dealers who sell seed at the minimum cost; the main object is the improvement of field crops;

Therefore, the Governor General in Council, under and in virtue of the provisions of Section 2 of The Seed Control Act, is pleased to order, and it is hereby ordered as follows:—

The nomenclature of grades of grain for seed purposes shall be as follows—the same having been revised and approved by the chief inspector or grain, viz.:

No. 1. Canada Western seed oats shall be composed of 95 per cent of white oats, sound, clean and free from other grain; shall be free from noxious weed seeds within the meaning of the Seed Control Act, and shall weigh not less than 36 pounds to the bushel.

No. 3. Extra Canada Western seed barley shall be composed of the six-row variety, sound, plump, free from other grain, of fair colour, free from noxious weed seeds within the meaning of the Seed Control Act and shall weigh not less than 48 pounds to the bushel.

No. 1. Manitoba Northern seed wheat shall be composed of 85 per cent of Red Fife or 85 per cent of Marquis wheat, sound, clean and free from other grain, and free from noxious weed seeds within the meaning of the Seed Control Act weighing not less than 60 pounds to the bushel.

For seed purposes Red Fife and Marquis wheat shall be kept separate.

No grain shall be accepted for seed which will require a large dockage to clean.

Seed inspectors shall observe the foregoing regulations in the grading of grain for seed purposes, nevertheless inasmuch as the operations of seed inspectors are dependent upon and follow after the operations of grain inspectors in respect of the grain to be examined as to suitability for seed purposes, the seed inspectors will remain subject to the approval of the chief inspector of grain or his deputy in all matters of procedure and prompt attendance to duties and for efficiency and accuracy of technical work done seed inspectors shall be responsible to the Minister of Agriculture.

Seed inspectors are authorized to certify ex-elevator the grain graded for seed purposes pursuant to the foregoing regulations.

Vide Canada Gazette, vol. xlix, p. 1062.

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By Order in Council approved under date the 8th day of October, 1915, the regulations under The Destructive Insect and Pest Act established by Order in Council under date the 4th day of November, 1914, and amendment thereto, were further amended as follows:—

1. Section V of that part of said regulations bearing the title "General Regulations," is amended by adding thereto the words "and in the case of potatoes or potato crops," and subsection (b) of section X of said part of said regulations is amended by striking out the last line thereof, to wit, the words "Powdery Scab (*Spongospora subterranea*)."

2. That part of said regulations bearing the title "Plant Disease Regulations" is amended by rescinding and striking out section IV thereof.

Vide Canada Gazette, vol. xlix, p. 1142.

By Order in Council approved under date the 25th day of December, 1915, the regulations under The Destructive Insect and Pest Act established by Order in Council under date the 4th day of November, 1914, and amendments thereto, were further amended by adding to that part of said regulations bearing the title "Plant Disease Regulations" the following section:—

IV. "Potatoes offered for export to the United States must be free from injurious diseases and insect pests."

Vide Canada Gazette vol. xlix, p. 2043.

By Order in Council of date the 14th day of February, 1916, the Orders and Regulations respecting Patents of Invention of date the 2nd October, 1914, made under and in virtue of the authority conferred by The War Measures Act, 1914, were amended as follows:—

1. That section 5 of the said Orders and Regulations be amended by adding thereto "and shall be valid notwithstanding any previous extension or extensions granted either under authority of the Patent Act or these Orders and Regulations."

2. That the following section be added:—

"10. In any case in which through circumstances arising from the present state of war, the Commissioner may deem it expedient, he may order that during the continuance of the war and for six months thereafter, neither the failure to construct or manufacture in Canada any patented invention, nor the importation of such invention into Canada shall in any way affect the validity of the patent granted in respect of such invention, notwithstanding anything in the Patent Act or in such patent."

A report from the Canadian Exhibition Commissioner for the fiscal year ended March 31, 1916, will be found as an appendix hereto. (See appendix No. 2.)

Having decided to participate in the Panama-California International Exposition held in San Diego, California, during 1916, the exhibits shown in the Canadian Pavilion at San Francisco in 1915 have been transported to San Diego and are now installed in one of the finest buildings on the Exposition Grounds, which has been placed at our disposal, free of charge, by the executive of the exposition.

This exposition is now in progress and will continue throughout the year 1916.

The Department was represented by Dr. Charles E. Saunders, Dominion Cereal-

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ist, at the joint session of the Co-operative Association of the Great Plains and the American Association of Agronomy, held at Mandan, N.D., July 14 to 16, 1915.

The department participated in the meetings of the American Association for the Advancement of Science, the Association of Economic Entomologists, and the Entomological Society of America, which were held in Columbus, Ohio, from December 27, 1915, to the 1st of January, 1916, and was represented thereat by Dr. C. G. Hewitt, the Dominion Entomologist.

His Majesty King George the Fifth graciously presented to the Canadian Government the thoroughbred stallion "Anmer" from his racing stud for the breeding of remounts in Canada.

The horse arrived in Canada in March last in fine condition, and I feel sure that he will do much to stimulate the breeding of good remounts in the Dominion.

II. ARTS AND AGRICULTURE.

DAIRY AND COLD STORAGE BRANCH.

The activities of the Dairy and Cold Storage Branch will be reported in detail in a special report for the branch. The following summary will serve to indicate the nature of the work carried on under the direction of the Dairy and Cold Storage Commissioner:—

I. DAIRYING.

COW TESTING.

As a result of the continued encouragement given to the cow testing movement, there has been a noteworthy increase in the number of cow testing associations organized, especially in the province of Quebec, in the number of dairymen throughout the Dominion who are interested in the plan, and in the total number of cows whose actual yield of milk and fat is systematically checked.

Cow testing includes such attention to the feeding question that not only is a larger yield per cow being obtained, but the feed cost of milk and fat is being appreciably lowered in many herds through feeding more intelligently and more in proportion to the cow's actual capacity of economical yet profitable production.

DAIRY RECORD CENTRES.

All the thirty-five dairy record centres have continued in operation. Under the supervision of the expert in charge of each centre new members have been constantly added, while in numerous instances very substantial increases in the yield per cow have been obtained following two principles which dairy records prove to be profitable, the weeding out of poor cows, and the tendering of better care and feed to the whole herd.

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The immediate assistance to dairy record centres and cow testing associations includes:—

(1) The supply, free of charge, of blank record forms, preservative tablets and acid for testing, as well as cash payments to men who test milk samples; (2) the distribution of bulletins, circulars and reports on the work; (3) the publication in newspapers of numerous popular articles on varied aspects of cow testing; (4) the holding of frequent meetings when addresses and explanations are given by the recorders, provincial dairy instructors and members of the headquarters staff; (5) personal visitation of members and other dairymen by the recorders and the three provincial supervisors; (6) an extensive and increasing correspondence.

DAIRY STATIONS: EXPERIMENTAL WORK.

The combined cheese factory and creamery at Finch, Ont., was operated during the entire year. The patrons delivered 61,808 pounds more milk and received \$5,013.06 more money than in 1914. The average price paid the patrons per 100 pounds of milk in 1914 was \$1.19. In 1915 they received \$1.35 per 100 pounds.

The Brome creamery, at Brome, Quebec, was burned down on July 11. Satisfactory arrangements were at once made with the Knowlton creamery, Knowlton, Que., to handle the cream from the two skimming stations at Owen's Corners and Brome Centre, as well as from the patrons at Brome. This arrangement was continued until December, when the business was closed down. The entire plant has since been disposed of.

The Madawaska creamery, situated at St. Hilaire, N.B., is operated under the supervision of the Dairy Division. The farmers in this district have very small herds of dairy cattle which makes the successful operation of the creamery a difficult problem, but with careful assistance it should in a few years be on a good paying basis. The output of the creamery in 1915 was 36,919 pounds of butter. An effort is being made to have the farmers along the different lines of railway ship their cream to St. Hilaire. The prospects are good for a substantial increase in the number of patrons in 1916.

EXPERIMENTAL WORK.

Experiments were conducted at Finch on the "Causes of Variation in the Percentage of Fat in Hand-separator Cream" and also on the "Value of Milk Containing Different Percentages of Fat for Cheesemaking." The information obtained was presented at the Dairymen's Associations in the different provinces and at many other meetings.

Experiments were made in manufacturing one-pound Cheddar cheese. These cheeses have become very popular in the city of Ottawa, and it looks as if there would be quite a demand for this style of cheese in the future. A 5-pound cheese was also made which sells very well both locally and in Ottawa.

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II. CREAMERY AND FARM COLD STORAGE.

A bonus of \$100 is paid to any creamery that erects suitable cold storage rooms according to plans and specifications furnished free by the department.

Working plans and specifications for small cold storages and dairies suitable for the use of farmers, hotels, and country merchants are also distributed free to all who apply for them.

There were thirty-nine applications for creamery cold storage bonuses received during the year, of which number thirty-three were approved. Since the year 1897 nine hundred and forty-seven creameries have received a bonus.

III. REFRIGERATOR CAR SERVICES.

FOR BUTTER.

The arrangement in force for several years past with the railway companies in Ontario, Quebec, and Nova Scotia, for refrigerator car services for butter, covering the period from the middle of March to the middle of October, was effective again last year. These cars are run weekly or fortnightly, according to the requirements of the route, on an advertised schedule, so that shippers can deliver their butter to the station with the least possible exposure to heat. A shipper may forward any quantity from one package upwards, and pay only the regular less-than-carload rate, without extra charge for icing. The department guarantees, on each car, two-thirds of the earnings of a minimum carload from starting point to destination, plus about two-thirds of the cost of icing. Inspectors are engaged at freight terminals in Montreal, Toronto, and Halifax to watch the unloading of these cars, to report on their condition, on the temperature of the butter and on the quantity of ice remaining in the bunkers. The reports are sent daily to headquarters at Ottawa, any defects or deficiencies in the service are then brought to the attention of the responsible railway authorities. In this way an efficient service is maintained.

FOR CHEESE.

Commencing about the middle of June and extending for a period of eleven weeks, the department pays the icing charges, up to \$5 per car, on a limited number of refrigerator cars, when used for carload shipments of cheese from one station.

FOR FRUIT.

A similar arrangement, except that there is no limit to the number of cars, is in force from the first of August to the first of October, for shipments of early apples and tender fruits, in carloads, consigned to Montreal and Quebec for export in cold storage.

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IV. CARGO INSPECTION.

Cargo inspectors are stationed at Montreal, Quebec, Halifax, Liverpool, Bristol, London, and Glasgow, to report on the condition in which perishable goods are delivered to and discharged from the steamships, and to supervise the handling generally. A large number of self-recording thermometers, known as thermographs, are used in this service; the records of temperature thus obtained being available for interested shippers of fruit, cheese, meats, etc. A Canadian shipper may, by application to the Dairy and Cold Storage Commissioner, secure complete records of any consignment from the time the goods arrive at the loading port in Canada until they are delivered to the consignees in Great Britain. Owing to the scarcity of tonnage the number of sailings during the year between ports in Canada and in Great Britain was very considerably reduced.

V. THE GRIMSBY PRE-COOLING AND EXPERIMENTAL FRUIT STORAGE WAREHOUSE.

The experimental cold storage warehouse, erected at Grimsby, Ont., under the direction of the Dairy and Cold Storage Commissioner, has been used the past season for:—

- (1) the pre-cooling of fruit for the general public;
- (2) demonstrations in fruit handling, packing and transportation;
- (3) experimental refrigeration tests with different varieties of fruit.

During the season, forty-three cars of fruit including strawberries, raspberries, plums, pears, cherries, and peaches were pre-cooled for western shipment. The cold storage space was available to growers, shippers and canners for the holding of fruit over the week-end, or at a time of glutted markets, and resulted in a large saving. Demonstrations were made in large lots with various packages for strawberries, cherries, tomatoes and peaches.

Valuable data have been secured and published in special bulletins as to various styles of packages, and the shipping qualities of different varieties of fruits.

Experimental work has been in progress with the rate of cooling fruit, with comparisons of refrigerator car temperatures, and with the degree of maturity at which fruits should be picked for pre-cooled shipments.

VI. THE ESTABLISHMENT OF LAWS.

DAIRY LAWS.

The work of inspection of dairy products has been carried out during the past year along the same lines as in the previous year.

The staff has been the same, consisting of six inspectors, three of whom devote their entire time to the inspection of dairy products. Three inspectors devote part of their time to other lines of work for the department.

Those engaged in the manufacture and sale of dairy products have become familiar with the provisions of The Dairy Industry Act, 1914, and Regulations passed under authority of this Act.

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Fewer samples of butter have been complained of on account of containing water, than during the previous year.

The fact that the Act and Regulations are being better observed is indicated by the decrease in the number of convictions. During the year ended March 31, 1915, there were forty-four convictions for violations of the Act and Regulations, while during the year ended March 31, 1916, there were only twenty-nine convictions.

COLD STORAGE LAWS.

The Cold Storage Act (chapter 6, 6-7 Edward VII), of which the details of administration are also in the hands of the Dairy and Cold Storage Commissioner, is intended chiefly to encourage the erection of small local public cold storage warehouses for the preservation of perishable food products. It provides that the Government may grant a sum not exceeding 30 per cent of the total cost of site, equipment and construction of such public cold storage warehouses. The subsidy is paid in instalments which are spread over a period of four years. No assistance is given to any company proposing to build in places where a public cold storage is already in existence. The rates charged in subsidized warehouses are subject to the approval of the Governor in Council.

The Cold Storage Warehouse Act of 1914 gives the Governor in Council power to make regulations respecting the operation and control of cold storage warehouses and the articles of food stored therein. No regulations have yet been made under this Act.

VII. PUBLICATIONS.

An annual report will be published giving in detail the work of the branch.

During the year under review the following publications have been issued:—

Bulletin 44. The Cold Storage of Food Products.

“ 45. The Testing of Milk, Cream and Dairy By-products by means of the Babcock Test.

“ 46. Determination of the Specific Gravity of Milk; The Percentage of Acid and Casein in Milk; Adulteration of Milk by Skimming and Watering; The Percentage of Water and Salt in Butter; The Percentage of Fat and Water in Cheese.

“ 47. The Grimsby Pre-cooling and Experimental Fruit Storage Warehouse.

“ 48. Pre-cooling, Shipment and Cold Storage of Tender Fruit.

Circular 13. Commercial Pre-cooling and Storage of Fruit for the Season of 1915.

“ 14. Causes of Variation in the Percentage of Fat in Hand-separator Cream.

“ 15. Cherry Pre-cooling Possibilities.

“ 16. Cow Testing Notes.

“ 17. The Probable Scarcity of Rennet for the Manufacture of Cheese.

Frequent contributions are made to the Agricultural Gazette.

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Members of the staff address a large number of meetings during the year, they act as judges at dairy exhibitions and at milking competitions, and through correspondence, increasingly heavy, act in an advisory capacity on a variety of subjects.

Two of the staff, A. W. Sorensen and E. W. Painter, have enlisted for overseas service.

THE SEED COMMISSIONER'S BRANCH.

The general policy of this branch, as outlined in previous reports, has been continued and some new work undertaken from which it is hoped much benefit to agriculture will be derived.

SPECIAL GRADES FOR SEED GRAIN.

With the co-operation of my colleague, the Minister of Trade and Commerce, special grades for wheat, oats, and barley entering the government interior terminal elevators have been provided. A section of each of the elevators at Saskatoon, Moosejaw, and Calgary is set apart for car-lots of grain that may be cleaned for seed. The grain is passed upon by a seed inspector as it comes into the elevator and is re-inspected during cleaning and when shipped out. The inspectors are responsible to the Seed Commissioner so far as certifying to the seed grades is concerned.

This grain is available to dealers or farmers at an advance over its commercial grade price sufficient to meet the extra dockage and the cost of storing, cleaning and sacking. On March 18, approximately the following quantities of seed grain were in store at the government elevators:—

Red Fife wheat.	8,500 bushels
Marquis wheat.	120,000 "
White oats.	71,000 "
Six-rowed barley.	3,900 "

Dealers and farmers have had great difficulty in securing, except at high prices, grain that was free from noxious weed seeds. One of the principal reasons was that in the ordinary course of handling grain through the terminal elevators, the clean was mixed with that badly contaminated with noxious weed seeds, so that practically none of it was fit for seed. It is anticipated that this difficulty will be to a great extent overcome when producers and purchasers are familiar with the new grades, and that large quantities of grain free from noxious weed seeds within the meaning of the Seed Control Act, and otherwise of high quality, will be available in Eastern Canada as well as in the West at a comparatively small advance above commercial grade prices.

VOLUNTARY SEED GRADE CONTROL.

Owing to the unusual weather conditions last fall, the corn crop did not mature normally and the supply of good seed, in Ontario as well as in the United States, promises to be short this year. In order to meet the present situation, and if possible

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to put the seed-corn trade in Canada on a more satisfactory basis, I authorized the Seed Commissioner to offer the growers the co-operation of the seed inspectors and laboratories for the introduction of a new system of seed-corn control.

The plan is based on the voluntary system which has been successfully employed in Europe. An agreement is provided whereby the grower undertakes to sell seed corn in the ear under clearly defined standards of quality and other guarantees. An alphabetical list of the growers under control is published by the department.

Many of the best and most extensive seed-corn growers are offering seed under the agreement and already something over 40,000 bushels of Extra No. 1 and No. 1 have been listed.

About 7,000 ear tests of corn have been made at the Ottawa laboratory in connection with the seed sampled for grading. Most of the lots have averaged above 90 per cent, and many above 95 per cent, the standard for Extra No. 1 seed corn. It is hoped that this system of marketing corn will prevent much of the misrepresentation that has been practised and that it will be mutually beneficial to growers and purchasers.

PAPER PACKET SEED INVESTIGATION.

An investigation into the paper packet seeds put on the market by the leading seedsmen has been commenced. Last spring about 2,500 samples were collected by the inspectors and sent to the Ottawa laboratory. They were tested for germination and examined to determine the comparative quantity supplied by different dealers and the range between packets from the same seedsman. The work will probably be continued for several seasons, but the results already obtained show that with most kinds of garden seeds contained in these showcase packets and marked at a given price per packet there was a substantial difference in the net weight and percentage vitality of the seeds put up by different seedsmen, and even with packets of the same variety filled in the same seed house the net weight of the seed was commonly found to be markedly variable. In many instances seed which was scant in quantity was also low in germination.

HOME PRODUCTION OF ROOT AND VEGETABLE SEEDS.

On account of the continuance of the European war, a serious situation has been created in respect to the supply of field root and vegetable seeds. Previous to the war, subvention was offered to growers to encourage the production of these seeds in Canada. When it became apparent that the European supplies would likely be cut off or greatly curtailed, further efforts were made to stimulate home production. Farmers and gardeners were advised to save parent stock for planting in the spring of 1915, and specially trained men were employed to direct growers and inspect their crops. During the summer of 1915, field root and vegetable seeds were grown by 163 farmers, and inspected by officers of this branch. Many of these farmers were growing only sufficient seed for their own use; sixty-four produced seed which passed inspection and for which subvention was paid. The seed produced on which subvention was paid amounted to over 36,300 pounds, the subvention being over

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\$1,300. The principal kinds and approximate amounts produced were: Sugar beet, 23,000 pounds; mangel, 8,200 pounds; sugar mangel, 1,500 pounds; swede, 3,000 pounds; radish, 400 pounds; garden beet, 350 pounds; onion, 350 pounds.

Owing to the accumulation of large stocks previous to the outbreak of war, it is not anticipated that there will be serious difficulty in supplying demands of most kinds of seed this spring; but unless much more seed than usual is grown in North America this year the situation may be serious for the spring of 1917. It is gratifying to be able to report that, on the whole, results in Canada are satisfactory, and it is to be hoped that a large number of farmers will grow at least sufficient seed for their own use this season in order to insure a supply for next spring.

FIELD CROP COMPETITIONS AND SEED FAIRS.

The policy of paying subvention to the Provincial Departments of Agriculture on the basis of two-thirds of the money paid out for prizes in field crop competitions, seed fairs and provincial seed exhibitions, within certain limitations, has been continued and apparently with satisfactory results. The number of competitions continues to increase and reports indicate that they stimulate interest in the production and use of better seed.

During the summer of 1914, 357 field crop competitions were conducted, on which a total subvention of \$25,140.56 was paid. In the winter of 1914-15 the subvention for the 145 local seed fairs amounted to \$6,167.90, and \$4,251 was paid for ten provincial seed exhibitions. During the summer of 1915 there were 408 field crop competitions on which subvention amounted to \$25,847.18.

SEED TESTING.

The work of testing seeds for dealers and farmers continues to increase. From September 1, 1915, to March 31, 1916, 10,228 samples were received at the Ottawa laboratory, compared with 9,022 for the same period last year.

During the fall and early winter most of the samples are from wholesalers. Later in the season a larger proportion comes from retail dealers and farmers. This year an unusually large proportion from wholesale dealers represents seed grown in the United States, as the Ontario crop of both common red and alsike clover seed is very poor. Scarcely 50 per cent of the red clover received from farmers this year has been sufficiently pure to be legally sold without re-cleaning. One difficulty that farmers have in preparing clover seed for market is that they find it almost impossible to get the proper screens with which to equip their fanning mills, as often they are not supplied by the manufacturers.

Most of the timothy seed sold in Canada is imported from the United States. The general quality varies considerably, depending on growing conditions. It is usually fairly pure, but during the past season most of it has been too badly hulled to grade No. 1. Some excellent Canadian-grown timothy has been received from Quebec and Western Canada. Much of the Alberta-grown seed put on the market has been badly hulled, but this apparently is due to lack of care in handling the crop. Seed can be

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produced quite cheaply in parts of Western Canada, and there seems to be a good opportunity there, if care is taken to handle the crop properly.

The seed testing at the Calgary laboratory consists largely in testing samples from farmers for germination. Oats usually form a large percentage of the total received. Last fall, though serious frost was not general in the West until most of the grain was ripe, there was considerable injury in some districts. Of the samples of oats received at Calgary from Manitoba up to February 22, 41 per cent germinated less than 80 per cent, and 12 per cent less than 50 per cent; from Saskatchewan, 33 per cent germinated less than 80 per cent, and 16 per cent less than 50 per cent; from Alberta, 40 per cent germinated less than 80 per cent, and 12 per cent less than 50 per cent.

SEED INSPECTION.

It is gratifying to be able to report that improvement in the seed trade is clearly indicated by inspection work during recent years. Last spring there was a decided increase in the proportion of high grade seed on the market, and greater care was exercised by both wholesale and retail dealers to comply with the Seed Control Act.

Previous to the inception of seed control legislation, much of the seed distributed throughout Canada was badly contaminated with weed seeds and low in general quality, and in many cases the purchaser had little means of knowing the quality of the seed offered. It is now exceptional to find seed put out by any of the large dealers which is not properly marked with the grade and otherwise sold in conformity with the law. Defining definite standards of quality for timothy, red clover, aliske, and alfalfa offered for retail and having the grade number marked has resulted in a greatly increased demand for high-grade seed, and a wider spread in prices between the high and low grades. One result of this has been that farmers who attempt to grow clover seed on dirty land find that much of their crop is unmarketable, except at a low price, because of the heavy loss in cleaning to make it saleable for seeding purposes. On the other hand, farmers who have clean land and take the trouble to hand-weed their crops, find ready sale for their seed at good prices.

Last spring thirty-seven men were employed as temporary inspectors to assist the permanent district officers. The inspectors visited 2,268 places, compared with 1,861 in 1914, and 4,078 dealers or farmers. Many of these places were visited several times. Although the inspection was more thorough than ever before, fewer violations of the Act were detected, which is an excellent indication of improvement in the trade. In the spring of 1915, 666 violations of the Act were detected by the inspection staff, compared with 708 the previous season, and 839 in 1913. Most of the violations were of a minor character, such as failure to indicate the grade number.

GENERAL WORK.

The general educational work, including assistance at short judging courses, general farmers' meetings, the distribution of reference collections of weed and economic seeds and the publication of reports and bulletins, has been continued. The usual financial assistance has also been rendered to the Canadian Seed Growers' Association.

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THE LIVE STOCK BRANCH.

In referring to the work of the Live Stock Branch, I am glad to be able to record a gratifying development of our export trade in live stock products with Great Britain and, to some extent also, with France. As will be pointed out later on, there were forwarded during the late fall and early winter, several shiploads of frozen beef which were purchased by the British Government on Army account. The lagoon trade has again assumed important proportions and has absorbed all the surplus hogs of the country. During the year, also, Canada exported to the same destination eggs to the value of \$2,800,000.

Following the period of financial depression and the very striking curtailment of meat consumption in the country, just precedent to and following the outbreak of the war, the profitable development of this export business has been of very great financial advantage to the country. The value of the business itself has had an important effect in assisting to sustain our national credit, while to those engaged in the industry the export outlet has relieved a situation which might have become very grave had our farmers been under the necessity of finding a market for their surplus, at a time of money stringency and restricted local demand. As it is, prices have been driven to a very high level and, in consequence, there is, at present, very evident indications of an increased production in practically all classes of our farm animals.

The stimulus thus given to live stock production, notwithstanding the high price of grain and of other fodder, is likely to have an important bearing upon the future of our agriculture. The extensive resources of our Dominion, agriculturally, will probably never be fully realized except through the continuous and progressive extension of our live-stock industry. It has never before been so clearly demonstrated that the financial stability of farming is dependent upon the breeding and feeding of live stock. This fact has been demonstrated not only to the farmer himself but, as well, to the banker and business man. It will at once be evident therefore, how significant, at the present moment, is the development of a live-stock export trade. It will be clear also how important it is that every reasonable assistance should be given toward promoting the industry as a whole and the increased activities of the Live Stock Branch are in keeping with our general policy, therefore, as relating to the department's attitude toward agricultural development.

HORSE DIVISION.

During the year this division continued the work of loaning stallions to associations in districts requiring this aid, throughout the Dominion. Forty-three stallions in all were purchased and placed. The department now owns 146 horses, placed throughout the various provinces. Over 75 per cent of the associations have sent in their renewal applications, while of the remainder, at least 15 per cent have asked that the stallions be exchanged, some of these being horses that have been placed two or three years. During the year many letters have been received expressing the thanks of associations, and telling of the improvement that was being brought about in the

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horse stock in the districts, through the use of the pure bred stallions loaned by the department. The stallions, as a whole, have been remarkably healthy and have invariably proven sure foal-getters. During the year only one horse was lost, due to catching cold while being shipped. Considering the number of horses and the widely different conditions under which they are kept the showing is an extraordinary one. Already, a large number of applications have been received for 1916-17, and it is evident that a goodly number of horses will be required for distribution.

Federal Assistance to Clubs.—A number of districts during the year organized for the purpose of hiring stallions for the use of members and to take advantage of the grant made by the department. These clubs were formed chiefly in the western provinces, and have proven very satisfactory, wherever tried. Judging from inquiries a large number should take advantage of the offer this year. Some of the best horse-men in the Dominion have written in to say that, in their opinion, the scheme is one of the best that has ever been inaugurated in any country in aid of the horse industry.

During the year an official of the Commonwealth of Australia, having seen a brief outline of the policy in one of the agricultural papers of that country, wrote for fuller information, which was accordingly sent. In his letter, acknowledging receipt of the booklets, he pointed out that, in his opinion, Canadian horsemen might very well look to Australia as a pure-bred market for Clydesdales, after the war. He suggested that a trial shipment should be sent over for the purpose of establishing a horse trade between the two countries.

During the first part of the fiscal year the horse trade was somewhat slow, and prices were accordingly lower than they had been some years previously. However, during the last three months of the year, conditions changed very materially and demand for good farm chunks increased, particularly in the West. During these three months almost 6,000 horses went through Winnipeg into the western provinces. During the same period almost 2,000 horses were exported to the United States, and from the outlook it would appear that buyers from across the line would continue to come for some time at least. Prices for good farm chunks and street horses have risen accordingly, and it would appear that these prices will be maintained for some time to come. Since the outbreak of war upwards of 50,000 horses have been purchased for army purposes. Buyers now report that horses are becoming scarcer and harder to get.

Through the Live Stock Branch, therefore, I have considered it advisable, to urge, by means of the agricultural press and otherwise, that farmers should not only keep their good mares, but breed them, as there is every likelihood of there being a scarcity of horses in the very near future.

CATTLE DIVISION.

DISTRIBUTION OF PURE-BRED BULLS.

The number of pure-bred bulls loaned by the Department through the Live Stock Branch to farmers' associations throughout Canada has increased year by

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year since the inauguration of the policy in 1913. On December 31, 1915, the number in the hands of associations was as follows:—

Breed.	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.B.	N.S.	P.E.I.	Total.
Shorthorn.....	8	124	221	44	68	94	1	9	22	591
Ayrshire	8	3	4		4	125	5	21	7	178
Holstein.....	8	4	20	10	13	29	1	3	2	90
Hereford.....		9	2	9	2	5				27
Angus.....	1	1	2	4	1					9
Canadian						9				9
Jersey.....	1					2	1	3		7
Guernsey.....	1							2		3
Red Polled.....	1		1							2
	28	141	250	67	88	265	8	38	31	711

These sires are loaned for only one year at a time, and an association is required to meet the cost of maintaining an animal as long as it remains in its hands. The department reserves the right to inspect the animals at any time and withdraw assistance in the event of it being found that an association is not living up to its agreement. An association may renew its application for the loan of the same animal at the expiration of its term, and, if all the requirements have been complied with, such applications are promptly approved. When necessary the sires are exchanged, but only for animals of the same breed. The advantage of systematic inspections of bulls loaned has been demonstrated during the past three years. Our inspectors have, by their advice and recommendations, been able to do much towards promoting the objects of the associations, and have in many instances prevented organizations from disbanding after a year or two of effort. In addition it has been found that our bulls are kept in much more satisfactory condition when inspections are made regularly. Usually one visit in the course of a year is sufficient, but where it is found necessary, two and even three visits are paid.

Upwards of 500 associations have been in operation for two years or over, and there is now some opportunity to judge of the results obtained. In this connection it is gratifying to note that the annual reports which have been received from associations in the spring of 1916 have, with very few exceptions, indicated that the use of the sires supplied has resulted in a very material improvement in the calf crop of the districts and has increased interest in live stock production. The reports of our inspectors this year so far as they have been received also indicate that the bulls are being much better handled than even a year ago, and that the quality of their progeny is very superior to that of the ordinary stock of the district. An effort is being made to encourage the members of the associations to feed their young stock properly so that the advantage obtained by superior blood will not be lost through unintelligent handling.

PURCHASING BREEDING STOCK IN OVERSEAS MARKETS.

To effect a more equal distribution of our livestock population the granting of assistance through the Live Stock Branch to farmers wishing to secure good breed-

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ing stock has been authorized. Under this policy the department pays reasonable travelling expenses of the representative of individuals or associations from any section of Canada desiring to purchase one or more carloads of breeding stock in any part of the country, the expenses allowed to cover railway transportation and living expenses from the home of the purchaser to the point at which it is expected that the purchase will be made, also hotel expenses and livery expenses for the time which should be sufficient to purchase the consignment. No assistance in the payment of freight is rendered, nor is any responsibility assumed by the branch in connection with the purchase price of the consignment. Further, no assistance under this policy is rendered if stock is purchased for speculative purposes. If desired, a suitable person is nominated by the Live Stock Commissioner to accompany the purchasing agent and assist him in buying and shipping the consignment.

This policy has been widely taken advantage of during the early spring months of 1916, and it is expected that the plan will have an important influence in conserving the breeding stock of the country and in increasing our live stock production.

RECORD OF PERFORMANCE.

During the year 1915-16 the interest previously exhibited in this work has been fully sustained. There has been a larger increase in the number of applications than for any previous year, and also fewer withdrawals. The number of cows qualifying has also been greater. The record of average production of cows of all breeds have shown an increase so that, not only are more cows qualified, but the average production is larger. These two facts indicate that more care is being taken in the breeding and feeding of pure-bred dairy cattle than formerly, the credit for which is, to some extent at least, due to this work.

The Record of Performance is now being recognized in other countries to be sufficiently accurate as a yearly test for all practical purposes.

The following is a short summary of the work for the year:—

Number of cows entered in the test—	
Ayrshires.. . . .	677
French-Canadians.. . . .	43
Guernseys.. . . .	19
Holstein-Friesians.. . . .	713
Jerseys.. . . .	198
Shorthorns.. . . .	121
Total.. . . .	1,771
Number of cows qualified—	
Ayrshires.. . . .	175
French-Canadians.. . . .	8
Guernseys.. . . .	7
Holstein-Friesians.. . . .	233
Jerseys.. . . .	57
Shorthorns.. . . .	34
Total.. . . .	514
Number of bulls qualified—	
Ayrshires.. . . .	14
Holstein-Friesians.. . . .	9
Jerseys.. . . .	4
Shorthorns.. . . .	1
Total.. . . .	28

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APPENDIX.

The records tabulated in the appendix are for cows which have produced sufficient milk and fat to qualify, but which have failed to freshen within fifteen months after the commencement of the test:—

Ayrshires..	18
Guernseys..	2
Holstein-Friesians..	50
Jerseys..	10
Shorthorns..	3
Total..	83

SHEEP AND GOAT DIVISION.

The policy of loaning pure-bred sires to farmers' associations has now been in operation three years. Assistance of this nature is confined to districts where the farmers have difficulty in securing well-bred sires, or are in financial circumstances which restrict their ability to purchase the most suitable type of breeding male. In pursuing this work, it has been the purpose of the department to limit an association to a single breed, and advise persistent use of the original selection. Adherence to this system by societies has already shown results of the greatest benefit in fostering not only a keen desire amongst members to produce a better class of live stock, but in creating, as well, a uniform type within a district. An advance toward the establishment of the community system of breeding, which obtains so satisfactorily in Great Britain, is a direct result of this policy of the department.

Over four hundred rams of all the most prominent breeds were distributed in 1915. A decrease from the previous season occurred in the number of boars, namely, from 168 to 48. This was due to the diminished production of breeding hogs in the western provinces, from which many of the applications for boars had other years been received.

As a means of creating a greater interest in sheep production and more particularly of drawing attention to the most approved methods of preparing the fleece, an exhibit of wools has been collected together and presented at a large number of fairs throughout the Dominion. Many features, illustrating successful systems of pursuing sheep raising in this country, are also included. The interest alone displayed by the public in this exhibit augurs well for the future development of the sheep industry.

Still further encouragement is offered to sheep raisers through the medium of prizes for wool in the fleece by many of the exhibitors. This represents an innovation which is fully appreciated by wool growers and has tended to awaken a lively interest in the production of an improved product of wool. I feel that exhibits of this nature will very shortly assume equal proportions at our fairs to those of fat and pure-bred sheep.

The sheep industry generally has never been in a more flourishing condition. The upward trend of prices for both wool and mutton which has occurred has been most wholesome in the way of attracting interest to the sheep industry. Sheep are beginning to form a permanent asset in farming operations. For years, during the period of low prices, the industry was looked upon as a side issue, and farmers paid

little attention to the maintenance of their sheep. They had nothing before them to set as an incentive either to enter into the business or, if pursuing it, to improve their product. The opposite condition obtains to-day. A redevelopment of the industry is occurring upon a basis which will mean not only a steady increase in numbers but the production of a class of sheep and wool which will bring recognition throughout the world to Canadian flocks.

Poultry Division.

The most marked feature affecting the development of the poultry industry during the year has been the unprecedented demand for Canadian eggs and poultry on the part of the British market. Fortunately this demand occurred at a time Canada had a surplus for export. For some years previous to 1914, owing to the unusual demand in the western provinces, Canada had been importing eggs in quantities. The high prices prevailing, as a result, had the usual effect, however, and greatly increased production took place, not only in the eastern, but also in the western provinces as well. Some idea of the extent of the increase in production may be obtained from the following table showing the exports and imports of eggs during the past four years:—

CANADIAN Exports and Imports of Eggs.

Fiscal Year ending March 31.	Exports. Domestic Pro- duce.	Imports.
	Doz.	Doz.
1913.....	147,419	13,240,111
1914	124,002	11,274,036
1915	3,592,899	4,493,396
1916.....	7,898,322	3,783,952

It will be noted that the exports last year were more than double those of the previous year and at the same time Canada reduced her imports by nearly a million dozen. Since 1913 the increase in production has amounted to nearly 18,000,000 dozen, and it is estimated that the egg crop of Canada for the year 1915 was worth at least \$30,000,000.

During the year, in addition to continuing the egg and poultry trade improvement campaign initiated previously, special inquiry has been made into the requirements of the British market, and everything possible done during the time to insure that the quality of Canadian eggs going forward is such as will serve as a fitting advertisement for the Canadian product.

Within the Dominion, in addition to activity along lines of co-operative organization, the work of interesting both producers and consumers in the matter of improved quality has been continued.

During the year the Egg Candling Demonstrations were given at a number of the larger exhibitions and winter fairs in the eastern provinces and in British Columbia. In several instances the Egg Exhibit of the branch was also displayed.

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In all, a total of some sixty-three thousand people attended the demonstrations, and most of these left their names for candling appliances. An interesting feature of note was the increasing number of consumers who were learning to determine quality in eggs by candling. This was noted particularly in Toronto, Ottawa, Montreal, and Amherst, N.S.

Egg Classes at Exhibitions.—With a view of acquainting people more generally with the standards for Canadian eggs, arrangements were made with a number of the larger exhibition associations to offer prizes for eggs in accordance with these standards. The response was particularly gratifying, especially in the instance of the Canadian National Exhibition at Toronto, where over seven thousand dozen were entered for competition, and at the Ottawa Winter Fair in January when over 800 dozen fresh-gathered eggs were shown. This year classes for eggs graded in accordance with the standards are being included in the premium lists of fifteen of the larger exhibitions in Canada.

Meetings attended.—During the year officers of the Poultry Division took part in no less than two hundred and seventy-two meetings, at which it is estimated that 19,791 persons were in attendance, apportioned as follows by provinces:—

Province.	No. of meetings.	No. of in attendance
Ontario.. . . .	74	4,448
Quebec.. . . .	17	311
Manitoba.. . . .	21	694
Saskatchewan.. . . .	1	224
Alberta.. . . .	27	2,100
British Columbia.. . . .	5	226
Prince Edward Island.. . . .	127	11,646
Total.. . . .	272	19,791

AID TO FAIRS.

During the year, it had been brought to my attention, from various sources, that, owing to the financial depression, the larger agricultural fairs and exhibitions throughout Canada were likely to find themselves in a very embarrassing position as regards their financial obligations. Having to face greatly lessened receipts, through diminishing attendances and decreased entries, certain of them proposed to cancel their exhibitions entirely. Believing that this would be a very unfortunate development, particularly at a time when every sound agricultural movement needed to be fostered and encouraged, I thought it advisable to enter upon a policy of aid to the larger and more important fairs of the country. With this object in view, it was decided to grant assistance to fairs and exhibitions which should open their prize lists in all the utility classes of live stock and poultry to entries from any part of the Dominion and which had distributed for prizes in these classes, at their last preceding show, a minimum of \$5,000. By this means it seemed possible to draw a reasonably distinct and logical line as between the shows which should receive aid under this policy and the shows of a more or less provincial nature which had been receiving assistance in one form or another through Provincial Departments of Agriculture. To shows qualifying for the grant a sum equivalent to half the amount paid in prizes in the classes

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mentioned at the last preceding show, was given, it being understood that in no case should the grant exceed the maximum of \$5,000. It was decided to require that the prize lists in each case should be submitted to the Live Stock Commissioner for approval.

Under this policy, thirty-two shows in all participated in the aid given and received in the aggregate the sum of \$114,787.26.

THE MARKETS POLICY.

During the course of the summer, a new feature in connection with the work of the department was initiated. I refer to the organization of a markets policy, to consider and deal with matters affecting or relating to the marketing of live stock and live stock products.

It has been responsibly predicted that there will be an unprecedented demand for live stock following, and as a direct result of, the war. The very heavy drain upon the Australian and the Argentine herds for the filling of army contracts; the wholesale destruction of the stocks of cattle in Germany, Belgium, and France, together with the increasing interest which is being evidenced by Great Britain in purchasing supplies within her own dominions and, particularly, in Canada, would seem to indicate that this country may expect to be called upon to furnish, for the world's market both meats and meat products to an extent and volume never before experienced. I would refer at this point, especially, to the opportunities for the development of an egg trade, a bacon trade, and a chilled or frozen beef trade, as well as to the possibility of building up a substantial export business, even if only temporary, in such commodities as frozen pork, beef offal, corned beef, and army rations of various descriptions. Anything that can now be done, therefore, to place Canada in a stronger position to take advantage of this prospective trade should not only result in better returns to our farmers but, as well, in materially strengthening the financial and commercial position of the country.

To secure this end, in so far as it is possible to do so, and to obviate many of the difficulties which at present exist, I have felt justified in providing that definite attention be given to the whole marketing problem as related to live stock. To make clear the scope of the markets policy as it is being organized, it may be pointed out that, amongst other things, it will involve the consideration of:—

1. A comprehensive intelligence system.
2. The organization of a system which shall provide for the dissemination of the information thus acquired to farmers, feeders, produce men, and others interested in the live-stock trade.
3. The extension of the system of organization of farmers for co-operative action in the sale of their products.

In addition to these important lines of activity, attention will be directed:—

1. To the promotion of a system of sale by grade and payment according to quality.
2. To the problems of transportation by railroad or steamship, as affecting live stock trade.
3. To an improvement in the method of handling stock from producer to packing house, with the view of avoiding losses by injury, of providing against waste and of safeguarding the position of the farmer in the sale of his stock.

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4. To the development of an export trade by such means as may reasonably and practically be undertaken and to the securing of a national reputation for the products which we may have to offer for sale on the export market.

The work has been placed in charge of the Assistant Live Stock Commissioner. The programme will be carried into effect through the utilization of the existing machinery in the Live Stock Branch and by the appointment of special additional officers who will assume responsibility for certain new and important features of the work already alluded to.

During the short interval since the initiation of the policy, considerable work has been accomplished. The most definite results have been achieved in connection with the co-operative sale of wool and of eggs, and in the improvement of conditions affecting the egg trade as considered from the standpoint of produce business. It should be explained that these particular phases of the work have been in operation for a considerable period and, as introductory to the extended programme which has now been undertaken, they have reached the status of complete and successful units in the movement which is being carried forward. There follows a statement of what has been accomplished during the current year in this direction.

SHEEP AND WOOL.

Similar assistance as last year was extended to sheep-raisers in the preparation of their wool for market. This comprises instruction in the grading or classification of the wool at the time or very shortly after shearing. Grading, it has been found, comprehends one of the most effective means of demonstrating to wool growers the variation in quality and condition which obtains in wool, and shows clearly the necessity of observing the utmost cleanliness if a high price is to be attained. A fleece containing an excessive quantity of extraneous material, as straw or burrs, is included in the "reject" class which sells considerably lower than the first grades. The spirit of emulation which is created amongst members of associations, to produce the highest type of wool, in itself makes grading a valuable and beneficial practice. Besides, purchasers can recognize more readily the character of graded wool and its real value in manufacture, and are assured of securing a uniform product.

In order to take advantage of the benefits of grading and at the same time of the facilities of disposing of large quantities of wool in a co-operative fashion, sheep-raisers in many districts have banded themselves together in associations. Organizations of this character have now been formed in every province, and in many instances cover a very extensive area. Approximately a million pounds of wool were classified for them by the experts of the department. Little difficulty obtained in disposing to advantage of the graded product, which was sold through avenues devised and controlled solely by members of the associations. It is estimated that the grading enhanced the price to the producers about 4 cents per pound, which alone should constitute ample evidence of the effectiveness of this measure.

EGGS.

Canadian eggs have found favour on the British market, as is apparent from the many favourable reports received and the enhanced price which the Canadian product

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has commanded in comparison with that of the United States. Some difficulty has occurred through the fact that large quantities of United States eggs have been repacked in Canada for export, and sold in Canadian cases. Last year an arrangement was made with the Customs Department whereby it was required that all packages containing foreign eggs coming into Canada and intended for export, should be branded with the name of the country in which they originated. The regulations governing this matter may have to be made more stringent, in order to adequately safeguard the interests of the Canadian product on the export market.

THE CO-OPERATIVE ORGANIZATION OF PRODUCERS.

As has been intimated last year, the work of the department in this connection has now been extended to the western provinces. Last fall Mr. T. A. Benson, who had been in charge of the movement in Prince Edward Island, since its inception, was transferred to Alberta. Mr. R. J. Allen, a graduate of the Ontario Agricultural College, was secured for the work in Manitoba, while Mr. J. H. Hare, previously associated with the egg trade improvement work has given general supervision of co-operative organization as connected with the marketing of eggs and poultry.

In Prince Edward Island, a general consolidation of the movement has taken place. A central candling station has been opened up in Charlottetown by the Producers' Association, and arrangements completed such that practically all the product of the local associations passes through this depot. This has resulted in a much more uniform article being placed on the market, and has given the members generally a feeling of greater confidence in the undertaking. As an indication of the solidarity of the movement in this province, it may be pointed out that, during the two months previous to the holding of the annual meeting in March, collateral to the extent of some \$10,000 had been subscribed by the members, with the view of placing the business on a more substantial basis.

In Ontario and Quebec, while no decided attempt has taken place to organize any number of new associations, the old associations have increased their membership considerably, and the value of the product marketed has been more than doubled. This is due not only to an increase in production but, as well, to the increased price obtainable for the improved quality of the goods marketed. In this connection, special reference might be made to the activity of a number of local units which have become affiliated under the name of the Lansdowne Farmers' Association and which last year marketed eggs and poultry to the value of over \$14,000.

THE EGG TRADE IMPROVEMENT CAMPAIGN.

The adoption of definite standards for Canadian eggs by the Canadian Produce Association in January, 1915, gave this work a decided impetus. Previously while a "loss off" system of buying eggs had come into quite general use throughout a considerable portion of the Dominion, the adoption of a system of "quality payment" had been seriously handicapped through lack of any definite or generally recognized standards. Although actually accepted by the trade in the eastern provinces, the produce firms in the province of Alberta were the first to really apply these standards in a practical manner. The lead taken by Alberta was shortly followed by

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Saskatchewan and, while not definitely put in force by the Winnipeg Produce Association in purchasing direct from producers, the standards were used in making inspections of carload lots intended for interprovincial trade.

Last year, for the first time in the history of the Dominion, fresh-gathered eggs were shipped in carlot quantities from Western Canada to the eastern provinces. Owing to the fact that the trend of trade previously had been entirely in the other direction, it required some time to establish a feeling of confidence on the part of eastern buyers in the western product. A medium of assistance in this connection was extended by the department through the location of an officer, temporarily, in Winnipeg, who, at the request of the Winnipeg Produce Association, gave a statement of grading on any lots of eggs intended for shipment. By so doing, the movement of eggs from the producing centres of the Central West was greatly facilitated, and the department was instrumental, early in the summer, in assisting in the movement of a large quantity of eggs to the eastern provinces. These, otherwise, would have been thrown on the Chicago market or left in the hands of local receivers, to the serious impediment of the poultry industry in the Prairie Provinces.

THE INTELLIGENCE SERVICE.

This being a new and somewhat unique undertaking, some time has been required in its organization. A definite programme, however, is steadily being rounded into shape, and officers have already been located at the leading market centres. In addition to the information furnished from this source, reporting upon conditions from country points has now been begun. A large amount of statistical and market data are being regularly received at the office, and it is expected that, within a very short time, the issuing of printed market reports will be commenced. This feature of the work is in charge of Mr. A. P. Westervelt, formerly Director of the Live Stock Branch, Ontario Department of Agriculture.

THE SALE OF FROZEN AND CANNED BEEF TO THE BRITISH WAR OFFICE.

Following an investigation of the conditions obtaining last fall as regards the export outlet for fresh and tinned beef, it became evident that the department was in a position to render material assistance in the development of our meat trade, through a representation of the claims of Canada to the British War Office. During the fall months, a great proportion of the Canadian supply of cutter and canner cattle finds its way to market. During the same period and before the closing in of winter, large numbers of grass cattle, both in the East and in the West, are offered for sale. Owing to the shortage of shipping space and to the fact that little connection had, as yet, been established for our beef and beef products on the British market, it became clear that, unless some definite action were taken, a serious glut would be occasioned, with consequent low prices to the producer. It is true that the American market has remained open to our stock, but the finding of an outlet through that channel, unless the product be sold as dressed beef, does not help Canada to realize the full return either to the producers, on the one hand, or, on the other, upon the investment of capital and labour in our packing-houses and railways.

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Steps were, therefore, immediately taken toward an improvement of this situation and, through the Acting High Commissioner for Canada in London, communication was entered into with the British War Office. As a result of the representations which were made, an initial sale of in the neighbourhood of 6,000,000 pounds of canned corned beef was speedily completed. Following the joint contract, the packers individually have been able to obtain additional sales of this and related products. As an immediate result of our action, the price to the farmers for cutter and canner cattle was held very steady and firm throughout the fall.

While the tender offered through the department by our packers in connection with the sale of fresh frozen beef was not accepted, we were able to secure the recognition by the British Board of Trade of the supplies which could be obtained from this country. As a direct result of the correspondence, there have been allotted to Canadian packers a number of refrigerator steamers for the transportation of cargoes, the sale of which was effected by the packers during the fall and winter. The outlet for the beef thus obtained has relieved the congestion which existed, and has given promise of a very strong market during the approaching season.

INVESTIGATION OF THE BRITISH MARKET.

Following upon the work already undertaken, I instructed the Assistant Live Stock Commissioner in December last to visit England and France, partly with the view of investigating the market for Canadian meat products in these two countries, and partly with the object of improving the connection of Canada with those charged with the purchase of supplies for the British Government and for the allied armies. During the trip, Mr. Arkell was able to obtain a reasonably accurate conception of the opportunity which exists of securing a satisfactory and profitable outlet for our produce. His review of the situation will be found in the current issue of the *Agricultural War Book*. I am happy to be able to state that his report indicates that the practicability of finding a remunerative market in Great Britain and France rests upon a very secure foundation.

While in London, through the good offices of the Acting High Commissioner, he had interviews with the Director of Contracts for the British Army; the Chairman of the Committee charged with the purchase of frozen beef for the British and allied Governments, and with the member of the Board of Trade having direction of the shipping space commandeered for the carriage of meats and other food products. These interviews assisted in initiating further business for Canada and in providing a basis of understanding which, no doubt, will prove an effective help in securing sale for this year's product.

DOMINION EXPERIMENTAL FARMS AND STATIONS.

Another active year is to be recorded in the operations of this branch. The regular lines of experimental work have been carried on at all the fully-equipped Farms and Stations.

Greater emphasis has been laid upon certain features of the work, and preparations made to study them in a more complete and accurate manner. Among these

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lines may be instanced the qualitative and quantitative study of commercial fertilizers. Field work in this connection is being carried on at several of the eastern Farms and Stations.

Plant pathology laboratories have been established at Fredericton, N.B., and at Charlottetown, P.E.I. These are in charge of qualified men, who will devote their energies to the study of the plant diseases found in those provinces, and in the provinces of Nova Scotia and Quebec.

With a view to ascertaining the possibilities of producing fibre flax with profit in Canada, a preliminary investigation was carried on during 1915. Fibre of good quality was obtained from flax grown on the Central Farm and by certain growers in western Ontario. Preparations have been made for a wide test of the possibilities of this industry.

During the year the Division of Extension and Publicity and the Division of Illustration Stations have been thoroughly organized. The former division takes charge of the exhibition work carried on by the Experimental Farms system and also uses many other means of making the work of the Farms more widely known. It has already done excellent work in both these directions. On the Illustration Stations the plan of work mapped out was put into operation successfully and much interest has already been shown by the farmers living near.

On the newer Stations, the introduction of these has been going on as rapidly as the land can be got into condition and the necessary buildings erected. Delays under the latter head have again hampered the work, especially with live stock.

Small areas have been added to the Experimental Stations at Charlottetown, P.E.I., Lennoxville, Que., and Rosthern, Sask.

An Experimental Farm site has been chosen at Kapuskasing, Ont., and one at Spirit Lake, Que., both in connection with the internment camps located at those points. Preparatory work in clearing and draining is being done by the interned prisoners of war.

During the year the following publications have been issued or are in the press:—

The Annual Report of the Experimental Farms for 1914-15.

In the Regular Series—

No. 86.—The Cultivation and Improvement of the Apple in Canada, by W. T. Macoun.

In the Second Series of Bulletins—

No. 24.—Plant Diseases of Southern Ontario, by W. A. McCubbin.

No. 25.—Tobacco Growing in Canada, by F. Charlan.

No. 26.—Bees and How to Keep Them, by F. W. L. Sladen.

Circulars issued—

No. 10.—The Late Blight and Rot of Potatoes, by Paul A. Murphy.

No. 11.—The Black Leg Disease of Potatoes, by Paul A. Murphy.

Pamphlets issued—

No. 5.—Asparagus, Celery and Onion Culture, Revised edition.

Numbers 2, 3 and 4 of "Seasonable Hints" were issued. Large editions of this pamphlet, and, indeed, of all Experimental Farm publications, are now needed, owing to the great expansion of the mailing lists.

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In connection with the exhibition work, the number of exhibition circulars has been increased materially, and new editions of many of those issued last year have been prepared.

In March there was received at the Central Farm, the horse "Anmer," a gift from His Majesty to the Government of Canada.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

Spring opened late in Prince Edward Island, and seeding of cereals was not completed until the end of the first week in June. Ample rainfall and good growing weather brought crops on rapidly. The hay crop was heavy except on low-lying land. The yields of cereals were among the best in many years. On the Experimental Station, they averaged the highest of any year since its organization. Potatoes were considerably below the normal crop. Roots were an average yield. Fall pastures were good, and live stock went into the stable for wintering in good condition.

Experimental steer and lamb feeding was carried on at the Station during the winter. Good prices for the finished animals were realized in March.

During the year a poultry administration building and a 100-hen poultry house were erected. A plant pathology building was also put up and will be used as headquarters for the officer studying diseases affecting plants in Prince Edward Island.

An area of about five acres was added to the Experimental Station under a five-year lease with option of purchase.

EXPERIMENTAL STATION, FREDERICTON, N.B.

The winter of 1914-15 was comparatively mild, but the following spring was late. Almost no sowing was done in April, and wet weather in May delayed main seeding operations until the latter part of that month. June and July were also very wet, and many low-lying areas were drowned out. August was unfavourable for haying and harvesting, and but little grain was cut that month.

The hay harvest was finished in September, and the grain crops cut, under good weather conditions. The yield of hay was fair and grain gave a good crop. Corn gave a small yield owing to the wet, cool season. Potatoes were considerably below average.

Pasture was abundant throughout the summer, and fall operations were carried on under most favourable conditions.

An implement shed, a bee building, two colony poultry houses and a poultry administration building were built during the year.

EXPERIMENTAL FARM, NAPPAN, N.S.

Spring was late, with much wet weather, and seeding was greatly delayed. Hay was a heavy crop, though there was some difficulty experienced in saving it. Grain harvesting was finished in October. The yields of cereals were fair. Corn was a light crop, and potatoes a good one.

Some 150 interned prisoners of war were set at work on this Farm, on August 25, at clearing and breaking new land. The number was afterwards increased to

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200. After the clearing was finished they were employed putting in a new water system.

An extension to the horse barn was made, a new sheep barn built, and the farm buildings painted. A large amount of general repair work was done to the older buildings.

Experimental feeding of steers was carried on during the winter, and a good price was obtained this spring.

EXPERIMENTAL STATION, KENTVILLE, N.S.

Seeding was late owing to a cool and wet spring. The first good weather for farm work was the first week of June, when the main seeding was done, except on light, high land which had been sown the previous month. Hay was a heavy crop, but harvesting it was slow owing to lack of bright weather, and much of the crop was damaged.

Cereals yielded less than 1914. Potatoes were a light crop in many locations, especially where planted late. The apple crop was also light.

Owing to the heavy hay crop, more live stock than usual has been wintered. Experimental feeding of steers was carried on at the Station. The finished steers were sold in March, and a good margin of profit shown.

No building operations of importance were carried on at this Station.

EXPERIMENTAL STATION, STE. ANNE DE LA POCA TIÈRE, QUE.

The spring was very cold, and all growth was retarded by some two weeks.

Haying was completed July 21, at the Station and the crop was very light. Grain crops were good. Fodder corn gave an excellent yield as did roots also.

A large amount of tile draining and fencing was done during the season.

An implement shed, granary, root cellar, poultry administration building and a poultry house were built.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

Preparatory work was commenced during the year, and some field crops grown and variety tests carried on. A large amount of tile draining and fencing was accomplished. Delay in erection of buildings prevented live stock work being taken up beyond the experimental feeding of steers and lambs.

EXPERIMENTAL STATION, GATINEAU, QUE.

Very little work was done on the land during April, but nearly all sowing and planting were finished by June 1. The season was a favorable one. Hay was only a fair crop but of excellent quality. Cereal crops gave good yields. Fall work was favoured by a long period of good weather.

A considerable amount of fencing, draining and road-making was done. A new 100-ton silo was put up, and a wagon shed, brooder house, and a 100-hen poultry house built, as well as some alterations and repairs made.

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EXPERIMENTAL FARM, BRANDON, MAN.

Farming operations were general by April 9, and seeding was well on toward completion by the close of the month.

The weather remained somewhat cool until August when a hot, dry period hastened ripening, and cutting was general by the 12th. Yield and quality of cereals were good. Fodder corn was a poor crop owing to cool weather in June and July. Potatoes were fairly good. Field roots yielded well. Work on the land continued until November 7, when frost stopped the ploughs. A poultry administration building and a colony poultry house were erected and some painting of the farm buildings done.

EXPERIMENTAL STATION, MORDEN, MAN.

Preparatory work was carried on at this new Station under the supervision of a foreman manager. Field crops were grown and orchards and other plantations set out. During the winter experimental steer feeding has been carried on and a flock of sheep placed on the Station this spring.

The Assistant in Horticulture at Brandon has been transferred to Morden to take charge of that line of work.

No Station buildings have yet been erected at Morden.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

Seeding commenced on April 1. May, June and July were cool, with a fair amount of rainfall. Hay was a light crop. August weather hastened ripening, and about 80 per cent of cereal crops was in stook by the close of the month. Threshing was delayed by unfavourable weather in September, but was very generally completed by the end of October; wheat on fallow averaged about 30 bushels per acre, and on stubble about 18 bushels.

A poultry administration building, bee building, two colony houses, and a brooder house were built this year.

EXPERIMENTAL STATION, ROSTHERN, SASK.

Seeding was well advanced by the end of April. April, May and June were very dry, with severe frosts during the latter month; the hay crop was very poor as a result. Small fruits were injured and some sorts of vegetables killed. Rain in July benefited the grain crops, roots, and vegetables.

Grain harvest was completed in August. Wheat gave 18 bushels per acre, oats 30 bushels, and barley 24 bushels. The yields throughout the district were below the average. Potatoes were a very small crop, and fodder corn a failure.

A considerable amount of fall ploughing has been done.

Steers have been put under feeding test this winter, and sheep breeding experiments are under way.

EXPERIMENTAL STATION, SCOTT, SASK.

Seeding was general by April 13. Germination was good and growth satisfactory. Hay was a good crop and high August temperatures hastened ripening of

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cereals. The highest yield of wheat on the Station was 54.6 bushels, grown on well-worked summer-fallow, packed after sowing. Oats were a good crop, barley only medium, potatoes and roots gave an average yield. Little fall ploughing was done in the district, owing to the time taken up by harvesting, and the hard, dry condition of the soil.

A flock of sheep was placed on the Station for experimental breeding work.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

Seeding began about April 8, and was well on toward completion by the end of the month. Rainfall was ample during May and June, and growth was excellent. Alfalfa cutting was general by July 1, and the crop was a heavy one.

August was favourable to ripening the grains, and cutting was well advanced by the end of the month. Yields of cereals were good and in some cases very high. The potato crop was fair. Field roots were an average in yield. Less fall ploughing than usual was done.

As in previous year, experiments were carried on in duplicate, one set on irrigated land, the other under dry-farming conditions. The ample rainfall of last season lessened very materially the amount of irrigation required.

Feeding experiments with steers and lambs have been carried on during the winter.

A bee building was put up at this Station.

EXPERIMENTAL STATION, LACOMBE, ALTA.

Seeding commenced April 10, under good conditions as to preparation of land and abundance of moisture. Growth was rapid. Pastures were excellent and grass-fed live stock kept in first-class condition. Clover hay gave the heaviest crop in the history of the Station. Alfalfa was a fairly good crop. Yields of grain were remarkably high, reports up to 70 bushels per acre being received.

A piggery was built this season at Lacombe.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

Preparatory work was continued at this Station. Some field crops were grown, and orchards were set out. A considerable amount of breaking and grading was done. The pipe-line from the municipal water-works to the Station was laid and a large quantity of fluming put up, leading from this main line.

None of the permanent buildings has yet been built on the Station.

EXPERIMENTAL FARM, AGASSIZ, B.C.

The growing season opened favourably, with sufficient rainfall and good weather for sowing. The hay crop was heavy as was also the return from grains. Fodder corn gave a heavy yield, of good quality. Potatoes were a fair crop, as were also mangels. Turnips were injured by aphids.

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The usual experimental work was carried on with live stock, special attention being paid to the experimental feeding of swine.

A sheep barn, piggery, and a poultry administration building were erected, and an additional silo put up.

EXPERIMENTAL STATION, INVERMERE, B.C.

Ample and timely rainfall reduced the amount of irrigation required in this district. Yields of clover and alfalfa were heavy, both under dry-farming conditions and under irrigation. Yields of grain were good. Potatoes were a heavy crop, as were all garden vegetables.

A poultry house and a bee building were built.

EXPERIMENTAL STATION, SIDNEY, B.C.

The laying out of the areas for the various lines of work on this Station was continued and satisfactory progress made. Additional orchards and ornamental plantations have been set out, roads made, fencing put up, and draining done. Field crops of cereals and forage crops were grown and variety tests of fruits and vegetables made. Hay and grains all gave returns above the average. Small fruits gave good crops. Husking and ensilage corn did well. The potato harvest was, in general, light. Yields of vegetables were good.

Preparation of land for fall sowing was hindered by dry weather.

A poultry administration building and a bee house were erected.

SUBSTATIONS.

Experimental work was continued at Forts Vermilion, Smith, Resolution, and Providence, and at Grouard and Grande Prairie, in Alberta. In British Columbia, Mr. Thos. A. Sharpe continued experimental work on his farm. At Minto Bridge, Yukon Territory, some tests were made, and it is hoped to extend these during the coming year.

Making allowance for the climatic extremes of many of these localities, and the difficulties under which experimental work must necessarily be conducted at such remote points, the results obtained are most valuable and speak well for the interest taken by the experimenters engaged.

FIELD CROPS OF THE DOMINION.

A combination of favourable circumstances resulted in the grain harvest of 1915 being the greatest ever recorded in Canada. The factors referred to were:—

- (1) the large amount of fall ploughing done in 1914;
- (2) the excellent wintering of the fall wheat crop;
- (3) the prospects of high prices and the appeals for greater production leading to increased acreage being sown; and
- (4) the favourable growing and harvesting conditions of 1915.

The total estimated value of the field crops of Canada in 1915 is \$797,669,500.

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The acreage yield and value of the principal field crops are tabulated below from data obtained from the Census and Statistics Monthly:—

AREAS and Estimates of Yield and Value of Field Crops, 1915.

Crop.	Area.	Yield per Acre.	Total Yield.	Weight per Measured Bushel.	Average Price per Bushel.	Total Value.
	Acres.	Bush.	Bush.	Lb.	\$ cts.	\$
Fall wheat	1,208,700	29.41	35,551,600	58.71	0 90	32,011,740
Spring wheat	11,777,700	28.98	340,752,000	60.31	0 88	280,507,100
All wheat	12,986,400	28.98	376,303,600	60.19	0 88	312,569,400
Oats	11,365,000	45.76	520,103,000	36.01	0 34	176,894,700
Barley	1,509,350	35.33	53,331,360	48.25	0 50	26,704,700
Rye	112,300	21.32	2,394,100	56.32	0 79	1,890,000
Peas	196,210	17.73	3,478,850	60.74	1 66	5,780,700
Beans	43,310	16.70	723,400	59.61	3 05	2,200,800
Buckwheat	343,800	22.88	7,865,900	48.02	0 75	5,913,000
Mixed grains	466,800	37.54	17,523,100	44.98	0 57	10,034,700
Flax	806,600	13.18	10,628,000	55.28	1 50	15,942,000
Corn for husking	253,300	54.72	14,008,000	56.32	0 71	10,043,000
Potatoes	478,600	130.81	62,604,000		0 57	34,964,000
Turnips, mangels, etc	172,700	372.21	64,281,000		0 26	10,714,000
		Tons.	Tons.		Per ton.	
Hay and clover	7,875,000	1.39	10,953,000		14 22	155,807,000
Fodder corn	343,400	10.00	3,429,870		4 96	17,012,100
Sugar beets	18,000	7.83	141,000		5 50	775,500
Alfalfa	92,685	2.83	261,955		12 08	3,162,000

The following table gives the numbers of the principal classes of live stock in the Dominion for the years 1911-15, inclusive:—

NUMBER of Farm Live Stock in the Dominion, 1911-15.

Live Stock	1911.	1912.	1913.	1914.	1915.
	No.	No.	No.	No.	No.
Canada:—					
Horses	2,396,212	2,602,307	2,580,000	2,947,700	2,600,000
Milk cows	2,001,179	2,604,488	2,740,401	2,613,900	2,600,000
Other cattle	3,000,207	3,857,373	3,910,000	3,601,501	3,600,000
Sheep	3,175,200	3,000,000	2,100,000	2,000,000	2,000,000
Pigs	3,010,100	3,477,810	3,330,000	3,400,000	3,110,000

DIVISION OF CHEMISTRY.

The purely investigational work of this division has been rather seriously interfered with during the past year, owing to the enlistment of several members of the Chemical staff for military service overseas. This temporary deferment in certain lines of research is to be regretted, but under the circumstances was unavoidable for it was found impossible to obtain, at short notice and for temporary employment, capable men to take the place of those who had gone to the front.

Every effort has been made with the reduced staff to keep up what might be termed the routine work of the laboratory and to satisfy the ever-increasing demands

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of farmers for chemical assistance. Though it has not been possible to prevent a rather large accumulation of work, both chemical and clerical, the laboratory records show that a great deal of very useful work, for widely distant parts of the Dominion, has been accomplished.

The correspondence of the division continues to increase, clearly indicating a growing and ever keener appreciation of the value of chemical knowledge as applied to agriculture.

During the year, 4,393 agricultural samples have been received and entered for examination. These include samples collected in connection with investigations carried on by the division and those forwarded by the Meat Inspection Division, but by far the greater number have been sent in by farmers. The corresponding number of samples received the previous year (1914-15) was 3,829.

The work in connection with the chemical and microscopical examination of samples submitted by the Meat Inspection Division, Health of Animals Branch, has been continued. These samples collected at the various packing houses in Canada include preserved meats, lards, colouring matters, preservatives, spices and condiments, evaporated apples, etc., and numbered, during the past year 1,180. In the preceding year 662 samples were examined.

Very considerable progress has been made in the examination of the soils from the several irrigation tracts in Alberta. The chief object of this investigation has been to ascertain the suitability of the areas in question for farming under irrigation, and this has called more especially for a determination of the "alkali" where such has been found. In the reclassification by the officers of the Department of the Interior of the areas under examination, the reports from this division have been of the greatest assistance.

The influence of soil and climatic conditions on the composition of wheat has again been studied, wheat from the same stock being sown on the Farms and Stations of the Experimental Farm and the harvested grain analyzed. It has been demonstrated that seasonal conditions may profoundly modify the gluten content, a moderately dry soil and fairly high temperatures during the period in which the kernel is filling out being conducive to a hard berry of first quality.

The work with sugar beets has again shown the suitability of soil and climatic conditions in many widely distant points in the Dominion for the production of sugar beets for factory purposes. These results are of particular interest at the present time when so many inquiries are being received as to the possibilities of Canada as a sugar-producing country.

The investigation to determine the feasibility of preparing a nitro-potassic fertilizer by a process of drying and grinding Atlantic coast seaweed has been concluded. During the brief period of a factory operations, approximately 50 tons of seaweed fertilizer were produced from the experimental plant in Nova Scotia. It now remains to establish, through a comprehensive scheme of field experiments arranged for the year 1916, the fertilizing value of the material.

The ever-increasing demand for information on the nature and use of fertilizers necessitated the employment of expert assistance to undertake the supervision of investigational work in this connection and to deal with correspondence, etc., on the

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subject. Such assistance has been procured, and the division is accordingly extending its experimental work with fertilizers on several of the Experimental Farms and Stations. It will also be able to answer more promptly the large number of inquiries that are constantly being sent in regarding manures and fertilizers and the question generally of the up-keep and increase of soil fertility.

The widespread interest at the present time in the question of "liming" as a means of increasing the soil's productiveness has rendered desirable the analysis of many limestones sent by farmers and Provincial Governments for valuation. Limestones are variable as to composition, but it is evident from the results obtained that rock of excellent quality and quite suitable for the manufacture or preparation of crushed limestone or for burning to quicklime, occurs in many parts of Canada.

The examination of waters from farm homesteads continues as an important branch of the division's activities. Much has been done in impressing upon our farmers the importance of pure water, but the results obtained in the Farm laboratories indicate that the campaign against the use of waters from polluted wells must not yet be abandoned.

THE DIVISION OF FIELD HUSBANDRY.

The scope of the work of this division as relating to all Experimental Farms and Stations for the past four years includes:—

- (1) Studies in the methods of culture and curing of field crops.
- (2) Investigations of the relative merits of different crop rotations.
- (3) Determinations of the costs of growing field crops under regular farm conditions.
- (4) Tests of the influence of size and character of cultural implements on cost of crop production.
- (5) Comparisons (in a limited way) of varieties of grain and forage crops as food producers.
- (6) Experiments to show the value of underdrainage and irrigation.

The division at the Central Experimental Farm, Ottawa, is hampered in its work due to the fact that suitable land is not available for carrying on several lines of the experimental work that should naturally be included. However, besides providing supplies of grain and fodder for the up-keep of the live stock on the Farm, the following experimental work was conducted during the year.

WEATHER CONDITIONS AND CROP YIELDS.

The season of 1915 was characterized by an early seeding and a wet harvest. Spring seeding was in progress on April 21 and was continued uninterrupted until finished on the 29th of April. The temperatures, lower than usual during the month of May, retarded the growth of grain which had made a promising start. Corn planting, too, was delayed, on account of the cool weather, until the end of the month. The forepart of June was dry, and during the month the first cut of hay was taken. In July, corn, roots, and grain made good growth, but the latter was harvested with difficulty in August when the heaviest rainfall in years for that month was recorded. On September 26 severe winds damaged the corn crop, making the harvest tedious.

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more especially where the corn was allowed to grow too thickly. The weather continued fine throughout the month of October, providing a favourable opportunity for the harvesting of roots and potatoes and the finishing of autumn ploughing.

COST OF PRODUCTION OF FIELD CROPS.

In the following table is summarized the yields and costs of production of mangels, corn, oats, and hay:—

Cost of Production of Field Crops, Central Farm, 1915.

Crop.	Area.	Yield per Acre.		Cost to Produce.		
				Per Acre.	Per Ton.	Per Bush.
	Acres.	Tons.	Bush.	£ cts.	£ cts.	cts.
Mangels.....	1·00	21·87	72·91	33 90	1 55	4·65
Ensilage corn.....	32·3	16·58	.....	23 99	1 45	.....
Oats.....	38 5	.....	69·4	69 17	.....	19·39
Oat straw.....	38 5	1·19	.....	.....	2 28	.....
Hay.....	39·0	3·67	.....	18·34	5 00	.....

ROTATION OF CROPS.

The most important investigation work at present in progress at the Central Farm is the testing of rotations considered suitable for live-stock farming. Thirteen rotations varying in duration and treatment are now permanently located which are being studied, keeping in mind the following points of merit:—

- (1) Their ability to supply different crops in the proper proportions for certain needs.
- (2) Their power to keep weeds in check.
- (3) Their comparative profit.
- (4) Their effect on the fertility of the soil.

Rotation “A” (five years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay, top dressed with manure in autumn; timothy hay, field ploughed in August, top worked and ribbed up in October; grain, seeded down with red clover to be ploughed under the following spring when the succeeding hoed crop is corn.

Rotation “B” (five years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass, seeds top dressed with manure in autumn; clover hay, ploughed in autumn; grain seeded down with clovers and grass; clover hay.

Rotation “C” (four years’ duration).—Hoed crop, manured; grain, seeded down with clover and grass; clover hay; timothy hay, field ploughed in August, top worked and ribbed up in October.

Rotation “D” (three years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay.

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*Soiling Crop, Rotation "R" (three years' duration).—*Corn for early fall feed, manured; peas and oats to cut green, seeded down with clovers and grass: clover hay, to cut green.

Some characteristics of the above solutions desirable under almost any conditions, are as follows:—

(1) Grain fields are always seeded down with clover, even though it be used only as a fertilizer, as in the case of the fifth year of rotation "A."

(2) Grass and clover seedings are heavy. Increased crops of hay and rare failures of a catch have justified them.

(3) Hoed crops form a large proportion of every rotation. An attempt to farm a small area without a hoed crop was not successful. Weeds could not readily be kept in check.

(4) No field is left in hay for more than two years. Our records show that the second crop almost always costs more than the first per ton, and that succeeding crops are very liable to be grown at a loss.

(5) Barnyard manure is applied frequently in comparatively small quantities, rather than at long intervals in large quantities.

The following record shows the comparison of the chief items in connection with these rotations:—

Cost, Returns and Net Profits of Rotations, "A," "B," "C," "D," and "R."

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profit per acre.
	\$ cts.	\$ cts.	\$ cts.
A (five years' duration)	18 22	26 61	4 79
B (five years' duration).....	17 78	18 75	97
C (four years' duration).....	18 10	22 44	4 34
D (three years' duration).....	20 44	23 47	3 03
R (three years' duration).....	21 67	28 79	7 22

SHALLOW PLOUGHING AND SUBSOILING VERSUS DEEP PLOUGHING.

Two four-year rotations differing only in the preparation of the sod land for roots or corn as mentioned above are used, but the results of twelve years have failed to show any decided advantage in favour of either method. In the past year the results were in favour of shallow ploughing, while the average for the period of twelve years has shown a slight advantage in favour of the deep ploughing.

COMMERCIAL FERTILIZERS AS A PART SUBSTITUTE FOR BARNYARD MANURE.

This experiment, started in 1913, was designed to supply information concerning the relative fertilizing merits of:—

- (1) No manure of any kind, but pastured one year in four.
- (2) Barnyard manure.
- (3) Complete commercial fertilizer.
- (4) Barnyard manure, together with commercial fertilizer.

The results show a distinct advantage in barnyard manure over commercial fertilizer alone for this soil, but point to the possibility of combining the two to good advantage when barnyard manure is scarce or high in price.

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ANIMAL HUSBANDRY DIVISION.

The Animal Husbandry Division of the Experimental Farms has made a satisfactory expansion in the scope of its work during the past fiscal year. The lines of work which fall to this division are the laying out and superintending of feeding, breeding, purchasing, management, and housing of farm animals; the manufacturing and marketing of their products, together with all experimental and demonstrational work connected therewith on the Central Experimental Farm, and, in consultation with the Director of the Experimental Farms and the Superintendents of branch Farms, the supervision of similar work on branch Farms and Stations throughout Canada.

LIVE STOCK ON THE CENTRAL FARM.

The horses on this Farm are all of draught type excepting the necessary drivers. Amongst the draught horses are a number of excellently bred Clydesdale mares which are used not only for general farm work but also for breeding purposes. Although in the past grave difficulties have been met in breeding operations with horses, yet the future of this work is more promising. Feeding experiments, both with the working horses and breeding stock, are being continued on the Central Farm in conjunction with somewhat similar work on the branch Farms.

The extremely important work with beef cattle is of necessity still curtailed for lack of sufficient housing accommodation. However, a few choice young steers are being finished for baby beef, not only to demonstrate the profits from such work, but also that these animals may be used for demonstrational purposes in lectures to the many visitors.

The herds of dairy cattle have progressed rapidly during the past year. Good representatives may be found of four breeds, namely, Ayrshires, French Canadians, Holsteins, and Jerseys, as well as a few choice grades of the Ayrshire and Holstein breeds. The milk production per cow has amongst all breeds increased largely during the past year. Some splendid records have been made by animals which were entered both in the Record of Performance and Record of Merit, all breeds showing a marked increase in maximum production and maximum profits. Many pure-bred animals from the herds are annually sold for a moderate price to breeders throughout Canada, it being the object in the making of these sales to place this stock where the greatest amount of good may be done. A large number of experiments in the feeding, breeding, and handling of dairy cattle have been conducted during the past year. An increasing number of experiments with equipment, such as milking machines, have been conducted. Special attention has also been paid to the feeding and rearing of young stock, and a large number of calf-feeding experiments have been conducted.

Experimental work along the lines of dairy manufacturing is continuing to hold a very prominent place in the work of this division. The manufacturing, curing, and marketing of many dairy products, such as butter, fancy cheeses, Cheddar cheeses, and the like, has received all attention possible under the existing circumstances. The gross receipts from this department during the past year have

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exceeded \$10,000. With the construction of a more commodious dairy, the amount of experimental work and the gross output may be increased. From this division also has been distributed a large amount of information regarding dairying, as well as free forms for the keeping of cow records, to thousands of Canadian farmers.

The sheep on the Central Experimental Farm have again shown a marked improvement both as to numbers, quality, condition, and profits. Only two breeds, namely, Shropshires and Leicesters, are represented on this Farm. However, from these flocks a number of excellent breeding animals have been distributed to branch Farms or sold to breeders throughout Eastern Canada. A number of experiments in the feeding and finishing of sheep for the market have again been conducted. It might be worthy of mention that lambs finished in winter on the Central Experimental Farm have for the past two years been sold on the Toronto market at the top market price. In March, 1916, lambs finished on this Farm created a new record price of \$13.75 per hundredweight, live weight, on the Toronto market.

Swine raising has again demonstrated itself as one of the good paying branches in this division. Three breeds are represented in this herd, namely, Yorkshire, Berkshire, and Tamworth. A large number of pure-bred animals has been sold during the past year for breeding purposes. Feeding experiments have been conducted both under summer, fall, and winter conditions. These experiments have dealt with more economical feeding, the choosing of superior foodstuffs both for raising on the farm and to be purchased on the markets, the saving of labour in the feeding of the hogs, and other such economic problems.

ASSISTANCE TO BRANCH FARMS.

The Dominion Animal Husbandman has visited the branch Farms and Stations throughout Canada and continued to be of assistance to the superintendents of these Farms. In conjunction with the superintendents many new lines of live-stock work have been undertaken. In addition, a large number of sketch plans of buildings proposed for these branch Farms and Stations have been made by this division, which plans have been approved of and completed by the Department of Public Works. By such means of co-operation, building work on the branch Farms has been facilitated. It may be again recorded that the modern buildings on the Dominion Experimental Farms are being copied, in their essentials at least, by a large number of both the small and extensive live-stock breeders throughout Canada.

MISCELLANEOUS.

The regular correspondence of this division has again increased more than 25 per cent over the previous year. Every possible assistance has been given inquiring farmers along the lines of maintenance of live stock, feeds, feeding, methods of breeding, and general management for improved health and increased profits.

A most gratifying result of the work in this division is the increasing interest of the Canadian farmer in the improving of his live-stock buildings. This division has continued to assist Canadian farmers in every way possible toward the planning of new or the remodelling of old farm buildings. Over 840 blue-prints of modern

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farm structures to suit the individual needs of farmers inquiring, as well as photographs and brief specifications, have been distributed during the past year.

Members of the staff of this division have judged at a large number of agricultural fairs and have addressed meetings throughout Eastern Canada during the year ended March 31, 1916.

HORTICULTURAL DIVISION.

There are four main features or subdivisions of the work of the Horticultural Division at Ottawa, pomology, vegetable gardening, ornamental gardening, and plant breeding, to each of which an expert devotes most of his time, the Dominion Horticulturist supervising the whole and paying especial attention to the work of the branch Farms and Stations.

The crops of fruit at the Central Farm, while not as good as in some years, were fair on the whole. Owing to the large number of varieties of apples under test, there is always a considerable proportion which bear, so that there never has been a failure of this crop in recent years. The information which has been accumulated on varieties of apples is very great. Yields have been kept annually of individual trees since 1898, so that it is possible to tell a prospective orchardist what trees of certain varieties are likely to bear at different ages. Marked differences have been found in the yields of trees of the same variety of the same age and planted the same year, and experiments are in progress to determine if these characteristics are repeated when the trees are propagated. Young trees propagated from such stock were fruiting in 1915, and each year's test will make this experiment more valuable. It has been possible as a result of experiments covering a long period to recommend a reliable list of varieties for places where the climate is somewhat similar to that at Ottawa. As an example, there is the McIntosh apple which has been under test at Ottawa since 1888. The value of this fine Canadian variety was soon demonstrated, and for many years the planting of it has been strongly advocated.

Plums.—It has been shown by the experience of the past twenty-seven years that the European or *Domestica* plums and the Japanese plums are not satisfactory over that large part of Canada which has a winter climate very similar to that at Ottawa. Occasionally trees will bear a good crop of fruit, but on the whole they are not a commercial success. In 1915, as in most other years, there was a good crop of the improved native and American varieties of plums, although the yield was not as good as usual owing to late spring frosts. For many years these varieties have been recommended instead of the European which, when planted, rarely bear fruit. The Cheney plum, one of the improved varieties of the Canadian wild species and one which has for a long time been recommended by the Horticultural Division, is grown very successfully over a wide area. The Omaha, a hybrid between the Japanese and American plums, is one of the most promising of the newer varieties, having the hardiness of the American and the firmness of the Japanese. As among the wild native plums there are some which ripen early, especial attention is being paid to these, and some very promising ones fruited in 1915.

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Pears.—Much expense must have been saved to prospective pear growers in the colder parts of Canada by the reports on experiments with varieties of pears at the Central Farm. In the original orchard most of the well-known varieties of good quality were tried, but none of them, with the exception of the Flemish Beauty, ever reached a fruiting age, and the Flemish Beauty never bore many crops before it succumbed. There was a good, but limited, crop of the Flemish Beauty in 1915, and this is the only good pear which, from the experiments at Ottawa, is likely to succeed where the climate is as cold as it is here. A few Russian varieties have proved hardy and practically immune from blight, but they are of inferior quality. They are, however, being used for crossing with the less hardy sorts.

Cherries.—Cherries, like pears, do not do well at Ottawa. Some varieties are hardier than others, among the hardiest being the Russian sorts, but, as a rule, the flower buds are killed in winter, hence they cannot be recommended for commercial planting in cold climates. There was a light crop in 1915. A wild Japanese bush cherry gives promise of being a valuable addition to the list of fruits for the colder sections. There was a fair crop of these in 1915.

Other fruits.—Much information has been obtained in regard to grapes, raspberries, currants, gooseberries, and strawberries at Ottawa, and the lists of varieties furnished and the methods of cultivation recommended have been published from time to time in the reports and bulletins. There was a good crop of all of these in 1915.

Vegetables.—The experiments in vegetables are of interest to many people, and it is planned to make them as useful as possible. In 1915 an overhead irrigation system covering 7 acres was installed at Ottawa for the purpose of determining what crops were benefited by artificial watering of this kind and whether it would prove economical for the average market gardener to install such a system. Owing to the wet weather in most of the growing season, the vegetable crops did not need any artificial watering, but at the time of setting out a strawberry plantation there was very dry weather when, without the irrigation, a large proportion of the plants would doubtless have died, but as a result of having the water, practically a perfect stand was secured.

As a result of the campaign for "Patriotism and Production" at the meetings of which the Dominion Horticulturist advocated the growing of more vegetables in backyards, a bulletin on "The Home Vegetable Garden" was published, for which there were many applications, a second edition becoming necessary in a few weeks after the publication of the first.

Ornamental Gardening.—Since the war began a marked increase has been observed in the number of letters received by the Horticultural Division to which the growers desire information in regard to the improvement of their home grounds. The war and the cessation of speculating in real estate have evidently turned the attention of Canadians more to the value of home life and attractive home surroundings than formerly, and many questions are asked in regard to the laying out of grounds and the selection and care of ornamental plants. In 1915 a bulletin on "The Cultivation

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of Hardy Roses " was published for which there has been a great demand. The trial grounds for flowers at the Central Experimental Farm are of much interest to visitors.

Plant Breeding.—The work in plant breeding was continued in 1915, crossings being made with fruits, vegetables, and flowers. Hardier and better fruits; earlier and better vegetables; and more beautiful flowers are needed in Canada, and some good material has already been obtained. Seedlings of Northern Spy and McIntosh apples having different seasons from their parents, but with their characteristic flavour, are among some of the most promising new fruits.

BRANCH FARMS AND STATIONS.

In last year's report an outline was given of the horticultural work in progress at the branch Farms and Stations and most of this work was continued in 1915, but in addition an extensive series of cultural experiments with vegetables at these Farms and Stations to cover a period of from three to five years was planned and experiments begun.

The Dominion Horticulturist visited most of the Farms and Stations twice in 1915 to discuss horticultural matters with the superintendents. Special mention should be made of the work at some of the newer Experimental Stations in 1915.

At Lennoxville, Que., orchards of 22 acres in extent, consisting of apples, pears, plums, and cherries were planted in 1915. One apple orchard was planned for cultural work only, a comprehensive series of plots having been laid out. Experiments were also begun with small fruits, vegetables, and flowers.

At the internment camps at Spirit Lake, Que., and Kapuskasing, Ont., tests were made with vegetables and flowers, and some small fruits were set out to obtain information as soon as possible which will prove useful to intending settlers to Northern Ontario. In the autumn of 1915 trees of hardy varieties of apples and bush fruits were sent to these camps which may ultimately be Experimental Stations.

The first horticultural work was done at the new Experimental Station at Morden, Man., in 1915, when hedges for windbreaks were planted. It is proposed to plant orchards and small fruit plantations and carry on other horticultural work there in 1916.

Owing to lack of water in the spring of 1915, the irrigation system not having been installed, practically no planting was done at the new Experimental Station at Summerland, B.C., but early in the summer the water was available and a fair crop of beans was harvested on part of the horticultural area. Plans for extensive plantings of fruit trees have been made for 1916.

CEREAL DIVISION.

The season of 1915 is noteworthy for the high yields per acre and the general good quality of the grain produced throughout the Dominion. While some sections were adversely affected, it is impossible to expect equal and uniform production in a country like Canada, possessing as it does, such widely differing meteorological conditions. In the Maritime Provinces, a cold wet spring retarded seeding and

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growth, a setback which fair weather in July and August could not overcome. The yields throughout these provinces were below those of 1914, while the grain was only of fair quality, due to the lateness of seeding. Exceptional weather conditions prevailed throughout the western provinces, resulting in a very high yield per acre of grain of splendid quality. Although a few districts through the lack of moisture, did not produce as abundantly as the major part of the provinces, on the whole the season was extraordinarily successful. In Ontario and Quebec early seeding was generally possible. A rather cold period prevailed in May and the beginning of June, accompanied by drought, but was followed by warm rains and pleasant weather. Judging from the growing grain, a maximum crop would have been produced, but unfortunately heavy rains, with hot, damp weather intervening, prevailed throughout the harvest season. The resulting damage was large, much grain being ruined, while that which was threshed was dark in colour and often low in vitality.

NEW CEREAL BUILDING.

Through fire of accidental origin, the main building of the division was destroyed by fire at the beginning of the harvest season. This building was used for the threshing and storage of seed grain, the selection and preparation of seed for distribution, and the general work of the division. With it, the implements and machinery of the division were lost, including the flour-mill and the stationary grain cleaner but recently installed. In addition to the pecuniary loss of equipment, seed of recent crosses and selections, as well as all seed of varieties under test held in reserve was also destroyed. This latter loss can scarcely be estimated. Immediate steps were taken for the erection of another, and it is now a pleasure to record that a larger and more commodious building has just been completed and placed at the disposal of the division.

MARQUIS WHEAT.

This wheat still stands as the champion of hard red wheat in America. Last autumn, at Denver, Colorado, for the fifth successive time, it won the world's championship. That this wheat still maintains its extraordinary record, is proof of its enduring quality, and justifies the universal popularity accorded to it in the western provinces.

NEW VARIETIES AND SELECTIONS.

Since the introduction of Prelude and Pioneer wheats, continued favourable reports have shown their ability to succeed under the climatic conditions for which they were chosen. Prelude, on account of its extreme earliness and splendid quality, has become increasingly popular in the northern districts, and as the settlement of these areas progresses, the use of this variety will become more general. Other new wheats designed to meet the peculiar needs of certain districts are now under test at our different Stations, while the work of selection from extensive crosses of the best of the present varieties is receiving the most careful attention.

Unfortunately the main stock of seed of the new ones was lost in the fire, and this work is of necessity retarded for a time.

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Many recent crosses in barley, peas, beans, and flax are being studied. It is expected, especially with the hull-less varieties of barley, that out of the promising material now on hand, some new varieties of striking value will be introduced.

THE MILLING AND BAKING WORK.

This work has had to be discontinued for a time, owing to the loss of the flour-mill and the enlistment of the milling and baking assistant for oversea service. The investigations along these lines now include not only the tests of new varieties and promising strains of wheat grown under different conditions, but also researches into commercial flours, bread improvers, etc. These investigations will be taken up again as soon as practicable.

DISTRIBUTION OF SEED GRAIN AND POTATOES.

The usual distribution of small lots of improved seed has been somewhat limited this last season, owing to the necessarily restricted space available for the work of the division while the erection of the new building was in progress. The insistence of the farmers on having seed of the highest quality is one of the most pleasing features of the work, showing that a keen appreciation of good seed is steadily increasing. The distribution seems to have its greatest value in the comparatively new settlements in the western provinces, numerous favourable reports giving evidence of its benefit there. Before the close of the present distribution, over thirty-six hundred samples of grain and twelve hundred samples of potatoes will have been sent out to various applicants throughout Canada.

DIVISION OF BOTANY.

DESTRUCTIVE INSECT AND PEST ACT WORK.

The potato inspection begun the year before was continued, so far as the Dominion was concerned, till about July, 1915. In view of the fact that the disease, powdery scab, had not been specially studied on the continent of America, there was carried out in Eastern Canada a series of uniform experiments, which clearly showed that the disease is only of minor importance, but naturally, where it has not yet occurred, it is desirable to use every precaution to prevent it and most vigorous and systematic efforts have been undertaken to stamp out the disease where present.

NEW FIELD LABORATORIES ESTABLISHED.

Two new field laboratories have been established, one in Fredericton, N.B., in charge of Mr. G. C. Cunningham, B.S.A.; and one in Charlottetown, P.E.I., in charge of Mr. Paul A. Murphy, G.A. These officers, by demonstrations, field experiments, lectures, and other means, are engaged in educating farmers to practise disease control. This work, although in its initial stages, has shown most satisfactory results; since, at a time when good seed potatoes are scarce, there are, as a result, enough sources of disease-free crops available to start the coming season with sound seed.

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Co-operation with farmers has been established throughout Prince Edward Island, Nova Scotia, Quebec, and New Brunswick; and it is confidently expected that powdery scab and many other potato diseases will shortly be greatly reduced or practically eliminated.

The field laboratories are not only devoting their time to potatoes, but also to any other plant pathological problem of economic importance.

ST. CATHARINES FIELD LABORATORY.

The work of this laboratory is making steady progress. Some years ago a very troublesome disease of peaches—peach canker—appeared, and spread rapidly throughout the peninsula. It is gratifying to be able to report that the assistant-in-charge, Mr. W. A. McCubbin, M.A., has now demonstrated that this disease can be controlled. Considerable research and experimental work are involved in the location of the outbreak of white pine blister rust recently observed in this locality. During the year a very useful treatise on "Fruit Tree Diseases" has been prepared by Mr. McCubbin, and was issued as Bulletin No. 24 (2nd series). During the winter the course in plant pathological instruction inaugurated last year was again held.

CENTRAL LABORATORY.

Among other special studies taken up during the year were preliminary investigations into the culture of medicinal and drug plants in Canada, and into the growing of flax for fibre. Mr. John Adams, M.A., Assistant Dominion Botanist, who has had some twenty years of close connection with the flax industry of Ireland, has devoted much time and attention to this work during the year.

During 1915 a number of plots of flax were grown on the Central Experimental Farm, seed for this purpose having been obtained from Holland through the Dominion Botanist and the good offices of Dr. Ritzema-Bos, by special permission of the Dutch Government.

In the month of September several samples of flax were collected at various points in southwestern Ontario and sent to Ottawa to be retted. Others were sent in from the Prairie Provinces by the superintendents of the different branch Farms. Sixteen samples were received from southwestern Ontario and fifty-three from the Prairie Provinces. Of the latter, four were from Brandon, Man.; nine from Morden, Man.; seventeen from Indian Head, Sask.; ten from Scott, Sask.; three from Rosthern, Sask.; nine from Lethbridge, Alta.; and one from Lacombe, Alta. One sample was grown at Grand Hog River Provincial Experimental Farm in Northern Ontario.

Sixteen samples were also retted for Dr. C. E. Saunders, Dominion Cerealist. These were grown on the Experimental Farms at Cap Rouge, Ste. Anne de la Pocatière, Fredericton, Indian Head, Rosthern, Lacombe, Lethbridge, and Agassiz.

All the samples were pulled, except one which was cut. With one exception, all were dried before being sent to Ottawa.

The bulk of the seeds appeared to have been ripe or nearly so at the time of pulling, but this was more difficult to determine after the bundles were dried.

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For the purpose of retting the various samples, small ponds about three feet deep were excavated in the corner of the Botanic Gardens near the Rideau canal.

The flax was immersed in these, and the ponds were several times pumped dry, and refilled with fresh water from the canal.

The time of immersion varied from three to nine days. At the time of immersion of a considerable number of the samples, the water was becoming too cold for satisfactory retting. The flax, after removal from the pond, was spread on the grass for several days to dry. It was then sent to the mill of the Ontario Flax Co., Ltd., at Parkhill, Ont., to be scutched and valued. The scutched fibre was arranged in six classes according to merit, class 1 being the best quality. None of the flax grown at the Central Experimental Farm was valued as class 1, and only one sample was placed in class 2. Nine of the samples grown in southwestern Ontario were valued as class 1, and four were placed in class 2.

Of the samples from the Prairie Provinces none were placed in class 1, and only two in class 2.

Of the sixteen samples tested for Dr. Saunders two were placed in class 1, namely, those from Agassiz, B.C. None of the others attained the rank of second class.

The ordinary routine work of the division is ever increasing, and, from the close contact with farmers and their special problems, beneficial results are becoming more and more apparent.

A new phase of work has been added during the year, viz., the preparation of cultures for the inoculation of leguminous crops with nitrogen-fixing bacteria.

THE BEE DIVISION.

The work of the Bee Division has continued to develop rapidly during the past year. A much-needed apicultural building, 27½ feet by 32 feet, with 2,100 square feet of floor space, has been erected at the Central Experimental Farm, and was occupied on February 11, 1916. The building contains a laboratory, offices and three bee cellars. The gathering of the work into one building with the apiary near at hand will greatly facilitate the experiments that are being conducted with bees.

The apiary work at the branch Farms and Stations, thirteen of which now keep bees, has been further organized during the year. The apiarist inspected each apiary during the warm weather in 1915, and gave advice to the superintendents and to the men in charge of the bees. Returns have been prepared showing the comparative profitableness of the bees at each Farm or Station, and steps have been taken to systematize means for the control, by manipulation, of swarming which is one of the principal causes preventing larger returns in the majority of apiaries in Canada.

Progress has been made in the study of the principal honey-producing plants of Canada, the conditions affecting the abundance of their yield, the duration of the yield and the quality of the honey. Some of this work has been done in temporary out-apiaries in the open country where the particular honey plants it has been found desirable to study are abundant. These temporary apiaries have been established in connection with the Central Farm and two of the branch Farms. It is expected that the information obtained will prove of considerable value to bee-keepers, showing them where bees may be kept with greater profit.

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The formation of collections of specimens of the honey plants of Canada, and samples of the honeys produced by them has been commenced.

Experiments in the breeding of bees have been continued, and useful data have been secured.

The subject of humidity in the bee cellar during the winter has been investigated in detail, and it has been found that in cellars where the relative humidity is low, such as are to be often met with in dwelling houses in the interior of Canada, a heavy mortality of bees may occur under certain conditions. Experiments have been made to ascertain the effect of supplying moisture when deficient, and also how such a deficiency may be best prevented.

Since some of the conditions for important features of bee investigation work are not met with in the Experimental Farm apiaries, co-operative experiments have been started with several enlightened bee-keepers in different places.

DIVISION OF FORAGE PLANTS.

The scope of the work of the Division of Forage Plants is gradually being extended, new lines being added each year. The most important new work taken up by the division this year is experiments with growing of field roots for seed.

VARIETY TESTS.

Since 1913, practically all varieties of Indian corn, mangels, turnips, carrots and sugar beets, grown at the Farms and Stations of the Experimental Farms system, have been tested in duplicate plots. By this arrangement the influence of soil variation on the yield of different varieties has been almost eliminated. As a consequence, the possible errors in the determination of the yielding capacity of the different varieties, as resulting from lack of soil uniformity in the experimental field, have been greatly reduced. Since the inauguration of the duplicate-plot system more uniform results have been obtained and more definite information secured as to the relative yielding capacity of different varieties in different parts of the Dominion.

Beginning with 1914, the value of varieties of field roots, tested at the Central Experimental Farm, Ottawa, has been calculated from the yield per acre and dry-matter content, taken together. By this arrangement the Division of Forage Plants has been able to come to a much clearer understanding of the real food value of the various varieties tested, and has, as a consequence, been able to advise farmers, more positively, to grow certain varieties in preference to others.

BREEDING WORK.

The breeding work with clovers, alfalfa, and grasses, started in 1912, is progressing very satisfactorily.

As mentioned in last year's report, the breeding work with clovers and alfalfa, so far under way, is being largely done with the object of producing hardy varieties, i.e., varieties able to come through the most severe Canadian winters without being wholly or partially killed. Breeding for hardiness is being based upon the assumption that what is called a variety of any clover or alfalfa is in reality a mixture of

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a very great number of strains distinct not only as to morphological characters but also with regard to biological qualities. It consists chiefly in elimination of all tender strains and in propagation of the hardy ones, the result being ultimately the creation of a "variety" composed of hardy strains only.

The importance of using hardy varieties has been clearly demonstrated as far as red clover is concerned, experiments at Ottawa having shown that there exists a most pronounced relation between hardiness and yield. The use of seed of hardy varieties of forage plants therefore means higher yields, i.e., larger revenue from the farm and increased stock-carrying capacity of a given acreage.

The breeding work for hardiness has also furnished proofs of the correctness of the statement, often made from theoretical grounds, that home-grown seed produces better crops than seed imported from somewhere else.

The breeding work with grasses, having for its main object the production of high-yielding and uniform varieties, is progressing satisfactorily. Most advanced is the work with timothy and Western rye grass, of which perfectly uniform varieties, superior to those now available commercially, are expected to be ready for comparative tests in a year or two.

FIELD ROOT SEED GROWING.

In order to secure data bearing on the possibility of growing field root seed profitably in Canada, experiments were undertaken at the Central Farm, Ottawa; Experimental Station, Charlottetown, P.E.I.; Experimental Station, Kentville, N.S.; Experimental Station, Fredericton, N.B.; Experimental Station, Lennoxville, Que.; and Experimental Farm, Agassiz, B.C. The results of the experiments not only show that seed of good quality can be raised in Canada, but they also indicate, most decidedly, that seed growing, if taken up by experienced men, familiar with field roots, may prove a very profitable business.

COLLECTIONS.

The herbarium material of grasses and other plants necessary for the proper understanding of the nature and value of natural pastures, and of hay made from wild grasses and kindred plants, is steadily being increased. Unfortunately, the division suffered a considerable loss this year, a large number of grasses and duplicates, intended to be used for exchange purposes, being destroyed in the fire which laid the cereal building in ashes. In this fire large quantities of various cultivated forage plants, collected for exhibition purposes, were also lost.

RANGE INVESTIGATIONS.

In co-operation with officers of the Forestry Branch, Department of Interior, Ottawa, the Dominion Agrostologist investigated the cause of cattle poisoning in the Crowsnest Forest Reserve, special attention being paid to the grazing areas in the Livingstone valley and the Porcupine hills. The investigation revealed that the only plant really dangerous to cattle in the districts mentioned, is the larkspur. A report, accordingly, was prepared and submitted to the Forestry Commissioner, Department of Interior, Ottawa.

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PUBLICATIONS ISSUED OR WITH THE PRINTERS.

Exhibition circulars—

- No. 10. Awnless Brome Grass versus Western Rye Grass, by M. O. Malte, Ph.D. (revise).
 14. Sweet Clover, by M. O. Malte, Ph.D. (revise).
 55. Alfalfa Growing in Eastern Canada, by M. O. Malte, Ph.D.
 57. Pitting Roots, by F. S. Browne, B.S.A.
 58. Mangel Seed Growing, by F. S. Browne, B.S.A.

DIVISION OF ILLUSTRATION STATIONS.

In April, 1915, farms for illustration purposes were selected and work started at the following places:—

In Saskatchewan.—Assiniboia, Cabri, Herbert, Kindersley, Maple Creek, Pambrum, Prelate and Shaunavon.

In Alberta.—Bow Island, Carmangay, Empress, Foremost, Grassy Lake, Jenner, Macleod, Magrath, Manyberries, Medicine Hat, Milk River, Pincher Creek and Whitla.

In July additional Stations were selected at the following places, work to commence in 1916:—

In Saskatchewan.—Moosejaw, Weyburn, Radville, Biggar and Lloydminster.

In Alberta.—Munson and High River.

It was also decided to establish Illustration Stations in the province of Quebec, and during the months of September and October selections were made at the following places, work to commence in 1916:—

Nominingue, Aubrey, St. Julie de Vercheres, Drummondville, Stanbridge East, Rimouski, St. Gedeon, New Carlisle and Lac a la Tortue.

The work of the Division of Illustration Stations has been carried on with the following objects in view:—

To put into operation under the supervision of the division, on farms owned and operated by farmers:—

(a) Methods of cultivation and crop rotations which have been found to give the best results on the Dominion Experimental Farms and Stations.

(b) To grow the grain, grasses and other crops most suitable to each particular soil and locality and at a minimum cost.

During the past year the following rotations were started at the various Illustration Stations, 45 acres being selected on each farm for the work.

ROTATIONS.

One Year Rotation.

Wheat continuously.

Two-Year Rotation.

Summer-fallow

Wheat

Wheat alternately

Summer-fallow alternately.

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Two-Year Rotation.

Corn	Wheat alternately
Wheat	Corn alternately.

Three-Year Rotation.

Summer-fallow	Wheat	Oats
Wheat	Oats	Summer-fallow
Oats	Summer-fallow	Wheat.

FODDER CROPS.

Alfalfa.—On a number of the Illustration Stations, alfalfa was grown for the following purposes:—

- (a) To produce the heaviest crop at a minimum cost.
- (b) Growing it in rows, two feet apart and growing it broadcast.
- (c) To produce a hardy strain of alfalfa seed.
- (d) To ascertain the amount of fertility added or taken from the soil.

Western rye grass.—Western rye grass was also sown, chiefly for fodder, on each of the Illustration Stations, and it, as well as alfalfa, made a very strong growth during the whole season.

Corn.—As mixed-farming is being encouraged, the growing of fodder crops will be necessary, hence varieties of corn considered suitable to the several districts are being grown. It is also felt that such a crop could be grown profitably and at the same time the soil cultivated sufficiently so as to eradicate weeds, conserve moisture, and minimize summer-fallowing. To illustrate this corn and wheat were grown alternately

MEETINGS.

During the year seventeen meetings were held in Ontario, Quebec, Alberta, and Saskatchewan. The meetings in Alberta and Saskatchewan were held in connection with the illustration work, the work being fully described by Mr. John Fixter; also several addresses were given by Mr. J. F. Irwin, Assistant to the Supervisor for the Western Provinces, Mr. W. H. Fairfield, Superintendent of Experimental Station at Lethbridge, Alta., and Mr. M. J. Tinline, Acting Superintendent of Experimental Station at Scott, Sask. Many inquiries were made by those in attendance, and much interest taken in the work, particularly in the different rotations and methods of cultivation.

Mr. J. F. Irwin gave interesting addresses on "The Value of Selection" and the "Cleaning of Seed Grain." He laid particular stress on the advisability of sowing the variety of grain suitable to the soil and conditions of the district. Mr. Irwin also gave statistics showing the marked difference in yields in favour of large plump seed, compared with the medium plump seed, also unclean seed.

Mr. W. H. Fairfield took part in the meetings held in Alberta and gave results of experiments in summer-fallowing. From experience Mr. Fairfield found ploughing on an average of 8 inches deep to have given the best results, also working the summer-fallow as early in the season as possible.

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Mr. M. J. Tinline gave results of experiments in "Crop Rotation," "Soil Cultivation," and "Seed Selection." Much interest was taken in the discussions following the addresses.

The results of 1915 were most encouraging, as on the whole heavy crops and a good quality of grain were produced, thus placing at the disposal of the farmers a supply of good seed at reasonable prices. This was one of the main objects of the illustration work.

The growing crops were a source of much interest to the neighbourhoods surrounding the different Illustration Stations. Many inquiries were received regarding the methods of cultivation and the varieties of seed sown, which goes to show that farmers are gradually realizing the necessity of more thorough methods in cultivation and the value of sowing the best seed.

DIVISION OF EXTENSION AND PUBLICITY.

Early in the spring of 1915 the Division of Extension and Publicity was formed under the Dominion Experimental Farms Branch, to continue and develop the publicity work begun and carried out during 1914 under the supervision of the Director of the Dominion Experimental Farms.

The excellent results which followed the placing of a Dominion Experimental Farms' Exhibit at some of the principal exhibitions held during 1914 confirmed past experience as to the educational value of carefully selected exhibits, and when planning the work for this year arrangements were made to attend 160 exhibitions and fairs in Canada; including a large number of the smaller fairs, for the benefit of the many thousands of farmers who seldom have an opportunity of visiting the larger exhibitions. Although for various reasons some of the exhibitions and fairs were cancelled by their respective managements, a Dominion Experimental Farms' Exhibit was shown at 115 places throughout the Dominion, beginning with the summer fairs in the Prairie Provinces about the middle of June and continuing until the close of the exhibition season towards the end of October.

By means of circular letters, correspondence with individuals, and attractive educational exhibits, wide publicity has this year been given to the Dominion Experimental Farms system, and attention has been specially directed to the locations of the branch Farms and Stations in every province with the object of having the farmers apply to those branch institutions nearest to them when seeking information or advice concerning their farm operations.

As a direct result of the work of this division, during 1915 applications were received from 54,870 persons who desired to have their names entered on the mailing list for the Farms' publications. There was also an increase very considerably above the normal in the number of letters from farmers asking for information on agricultural matters, the branch Farms and Stations, as well as the Central Farm, having been called upon to a greater extent than heretofore for practical advice on all lines of farm activity. In 1914 the Central Farm received 84,334 letters, an increase of forty-five over the previous year. During the past year 128,597 communications from all parts of the Dominion were received at the Central Farm. This

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increase of more than 44,000 was made up largely of inquiries from farmers who through the publicity work of the past year had learned that they were free to apply to the Dominion Experimental Farms' staff of specially trained men for advice and suggestions or for information regarding the work of the Experimental Farms and Stations.

There are yet in Canada many thousands of people on the land who have never heard of these Experimental Farms. Every effort will be made through the various channels of publicity to reach these people, and to keep them informed of the results of investigations and experiments concerning which they may be more particularly interested.

POULTRY DIVISION.

THE WORK IN GENERAL.

The work of the Poultry Division this year has been one of development rather than of extension, though a certain number of new experiments have been undertaken.

It has been the aim to complete the equipment of the branch Farms that have been in operation, and with two or three exceptions these eleven farms are now capable of housing the 300 laying hens that are kept at each Farm, and of conducting the operations necessary on the poultry plant.

A start was made this year on two more farms—Sidney, B.C., and Ste. Anne de la Pocatière, Que.

THE EXPERIMENTAL WORK.

While most of the experiments already under way in the division have been continued, considerable new work of an investigational nature has also been started. Among the new experiments might be mentioned: Cost of rearing different breeds, crossing in both hens and geese for table purposes, limited vs. farm range for growing turkeys, testing for brooding purposes, individual hovers, stove brooders and pipe brooders, the feeding of pituitary substances to increase egg production, etc.

THE BREEDING STOCK.

At the Central plant, Ottawa, the breeding stock of Rocks, Leghorns, and Wyandottes has been increased so that larger numbers of the varieties in which the experimental work is being conducted will be on hand. A number of other breeds are represented, but by only single pens. These are kept to illustrate the various popular breeds, and for crossing purposes.

In ducks there are three or four of the best egg and table breeds that are used to experiment on the production of eggs and meat. Several varieties of geese are experimented with for table purposes, and the crossing of the wild and domestic is being tested to better, if possible, the table qualities.

During the year turkeys were reared in semi-confinement. The results were very satisfactory. Over 40 per cent of those hatched were reared to maturity, and the average dressed weight of a number killed when 7 months old was over 16 pounds, one weighing as high as 19 pounds 2 ounces.

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THE BUILDINGS AT THE CENTRAL PLANT.

Four permanent buildings have been erected during the year. A water fowl house, on the duck plant, a commercial laying house for 100 hens, and two farmer's poultry houses holding 100 hens each. These latter two houses are similar to the farmer's poultry houses that have been erected on the branch Farms, and which have proved quite satisfactory.

BRANCH FARMS.

Work has been started on two more branch Farms, Ste. Anne de la Pocatière, Que., and Sidney, C.B. At Ste. Anne an administration building, one farmer's poultry house, and several colony houses were built, 100 Wyandotte pullets installed, and hatching and rearing will be conducted there this spring. At Sidney an administration building, a brooder house, and several colony houses were put up during the fall and winter. No hatching will be done there this spring, but day-old chicks purchased and reared.

EQUIPMENT COMPLETED.

The buildings and equipment have been completed at most of the Farms that have prior to this year kept poultry. At Agassiz, B.C., an administration building was constructed, a permanent poultry house at Indian Head, Sask., an administration building at Brandon, Man. At Cap Rouge, Que., one farmer's poultry house and a pipe brooder house have been erected, and at Charlottetown an administration building and one farmer's poultry house were added to the plant.

TOBACCO DIVISION.

For tobacco growing, the season of 1915 was one of the most unfavourable in many years. Speaking generally, the weather was too cool, and frequent heavy cold rains kept the tobacco plantations from drying off, thereby inviting attacks from plant diseases.

In Ontario, as in the United States, "Root Rot" (*Thielavia basicola*) did considerable damage. This was especially noticeable on "White Burley" plantations which had already, for some years, shown signs of infection.

Fortunately, as far as Ontario was concerned, the yellow tobaccos of the Virginia type, kiln-dried, and grown generally on new and better drained land were almost free from "root rot" and, as a whole, gave a more abundant yield and of better quality than the preceding year. In some parts of southern Ontario these tobaccos are gradually taking the place of the "White Burleys," the growing of which is becoming more and more risky.

In Quebec, although the plantations were not attacked by root rot, the tobacco suffered considerably from atmospheric conditions.

On the Station of St. Jacques l'Achigan and in the surrounding district the yields were below the average and except for the early varieties, the ripening was imperfect and the quality of the crop thereby lowered.

At the Farnham Station, of all the varieties grown in 1915, the "Big Ohio Sumatra" alone gave satisfactory yields.

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This new variety of wrapper tobacco tried this year for the first time on a fairly large scale (two arpents) showed itself very resistant to those adverse conditions which so seriously affected the other tobaccos like the Comstock Spanish and Havana Seed Leaf, which had been considered as early, hardy, and perfectly acclimatized. They were, however, completely washed out, and gave leaves of remarkably dry tissue, without body or elasticity, but little suited to use as "binders." Naturally, the weight of crop of these "washed out" tobaccos was below the average.

The drying process was carried on with some difficulty owing to that danger of fermentation in the curing barn, to which such tobaccos are peculiarly liable.

The method of hot-air curing, tried at Farnham in 1914, was again used this year. It has been proved that, in a favourable year, one may obtain from an early crop of Virginia a certain proportion of yellow leaves. This proportion, however, will always be less than that obtained under similar conditions in southern Ontario. Moreover, the yield in weight is generally higher in Ontario than in Quebec. It should be added that, in Quebec, the season is shorter and tobaccos of a slow growth, and which should commence to yellow before harvesting, may not mature. Moreover the harvesting period (mid-September) has much colder nights than has southern Ontario, which makes temperature control difficult. Also, in Quebec there is always danger of frost after the end of August.

Definite results were obtained in the study of the use of charcoal heaters in curing White Burley. These permit of the reduction of the humidity in the curing barn and prevent the tobacco spoiling from too slow curing.

Experiments in the treating of tobaccos on the field were prevented by weather conditions.

Special attention was paid to attempts to produce a commercially satisfactory tobacco for a cigar filler. Several varieties of tobacco suitable for use as fillers can be easily grown in Quebec, and others in Ontario where they might be planted in those districts not specially devoted to White Burley or the yellow tobaccos.

Generally speaking, after fermentation in bulk, these tobaccos have proved to be much too heavy in texture, although their flavour was admitted to be good.

Inquiry was made as to the methods employed in southern Ohio in dealing with filler tobaccos of heavy texture, and these were applied to the varieties grown in Quebec. The resulting product was suited for use as a "filler," although there is yet room for improvement.

Some 3,250 samples of tobacco seed were sent out to growers during the winter.

HEALTH OF ANIMALS BRANCH.

CONTAGIOUS DISEASES DIVISION.

A great deal of anxiety has been experienced during the past year owing to the continued outbreaks of foot-and-mouth disease in the United States. It has been necessary to exercise the utmost vigilance and enforce suitable restrictions to protect our live-stock interests.

In view of the importance of facilitating the shipments of British and French remounts from the United States, and appreciating fully the possibility of intro-

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ducing infection by this means, special measures were taken to guard against this danger. A very large number of these horses have arrived in Canada during the past year and have been fed and rested under the supervision of my officers in special yards reserved for this purpose. The cars in which they have been conveyed have all been disinfected before loading, and as a further safeguard, hay and straw in these cars have been removed at the boundary line and burned. Foot baths have also been supplied when considered advisable for the disinfection of the horses' feet. It is very fortunate, indeed, that the prompt and energetic measures taken by my officers have so far prevented an epizootic in this country of one of the most serious contagious diseases of live stock. An outbreak of this disease would cost this country a vast sum of money to eradicate. It would result in an enormous wastage in live stock and would also cripple the live-stock industry for an unlimited period. It is therefore very gratifying to learn that the United States authorities are now confident that they have eradicated this troublesome disease, and I sincerely trust that they will not again experience another such outbreak.

I regret to say that it has also been necessary to prohibit the importation of cattle, sheep, and swine from the United Kingdom, owing to the existence of foot-and-mouth disease in that country. Fortunately, however, the outbreaks have not been extensive, and the British authorities have been able to deal with them expeditiously. I have quite recently received official information that the disease has now been eradicated, and I will, therefore, be prepared to consider issuing permits for these importations directly sufficient time has passed to confirm this statement.

The statistics for the year 1915-16, which will be found in the special report of the Veterinary Director General, indicate that the aggressive policy now pursued has resulted in the safe control of maladies which come under the operation of the Animal Contagious Diseases Act.

With the increased duties devolving upon my staff, due to the United States foot-and-mouth situation, there has been a very marked activity on the part of all my field and boundary officers. It is pleasing to find that these men have performed their work, even under very trying circumstances, with diligence and despatch.

I am very glad to report that it has not been necessary to destroy so many horses for glanders as during the previous year. This serious disease of horses, asses, and mules has given the department a great deal of trouble and anxiety during past years. It was very prevalent in Saskatchewan, and a special effort was made a few years ago to eradicate this malady in that province. Although this has not so far been possible, it is quite evident that the disease is now under full control, and there is reason to believe that in the near future glanders will not be more common in Saskatchewan than in any other part of the Dominion.

There were approximately two hundred and twenty-eight (228) horses slaughtered for this disease throughout Canada during the past year, one hundred and seventy-eight (178) of these being in the province of Saskatchewan.

Owing to the compensation policy followed by my department in controlling this malady, it has been necessary to exercise care and to enforce suitable regulations in connection with the importation of horse stock from outside our boundaries. Horse

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entering this country from the United States are either detained at our quarantine stations along the boundary, and tested there, or they are tested at points of entry by officers appointed by the United States Federal authorities, whose charts the inspectors of my department are authorized to accept. The detection of glandered horses from time to time at the boundary has fully justified these precautionary measures.

I have to report that the very insidious and troublesome malady dourine still exists in the provinces of Alberta and Saskatchewan, more particularly in Alberta.

The infection of this disease was introduced into Alberta many years ago, and although all possible measures have been taken to eradicate it, this has not so far been possible. The department has, however, been able to control it and to prevent the extension of the infected area. This work has required very close attention, and it has been necessary to inspect before shipment every horse from any part of the infected area in Alberta and Saskatchewan. Range conditions have made it most difficult to deal with this malady.

It is indeed very fortunate that the research laboratory at Lethbridge was established a number of years ago. Dr. Watson, the pathologist in charge, with the facilities provided was able to perfect a system of diagnosis by the complement fixation test. Prior to the use of this test it was necessary to hold horses in quarantine for years, as the disease frequently assumes a very chronic form. It is not uncommon in these cases to find no symptoms whatever of the disease, although the affected animals readily transmit infection.

It is now possible, by testing the blood serum, which must be carefully collected, to detect horses affected with this malady, which from physical examination are apparently in perfect health. Very many thousand samples of serum have been tested at the Lethbridge laboratory. It is gratifying to report that there has been a marked decrease in the number of horses destroyed for this disease during the past year.

Mange in cattle and horses is still to be found to a limited extent throughout the Dominion. The outbreaks, however, with the exception of those in the mange area in Alberta and Saskatchewan, have been very few in number and in limited areas. My officers have not experienced any undue trouble in controlling and eradicating this disease in any part of the Dominion except the mange area. There are, however, many difficulties to overcome in dealing with mange on the range. It is almost impossible to isolate effectively mangy animals, and the weather conditions also regulate to a large extent our dipping operations. It is not at all an uncommon occurrence to be unable to treat mangy cattle for weeks and sometimes months. It is not surprising, therefore, that my officers are still dealing with this disease in districts where such unfavourable conditions exist.

The Veterinary Director General's figures show, in spite of these difficulties, very favourable progress has been made in dealing with cattle mange. There has been a very marked decrease in the number of cattle found affected with this malady during the past year. The improvement is so obvious that I am considering the advisability of removing the mange restrictions from a portion of the mange area. This action is very desirable at any time it is justified. The mange area covers a

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large territory and requires careful and systematic riding of the range by a large staff of range riders, who work directly under the direction of Veterinary Inspectors. As soon as this area is materially reduced it will be possible to make much better progress.

I am glad to find that the majority of stockmen are only too willing to follow the instructions of my officers, and the improvement which has taken place is largely due to their hearty co-operation.

Horse mange is still found largely in Saskatchewan, and while there has been as large a number of horses found affected throughout the Dominion as in the previous year, this is largely due to an outbreak in a limited territory in Saskatchewan. Fortunately the infection has not been widespread, and in many parts of the Dominion the disease has not been detected for many years.

Sheep scab has not been dealt with in any province except Manitoba. The disease was found in this province a year ago, and although all possible steps were taken to ascertain the source of infection, this was not determined. As the parasites producing this disease are known to survive very long periods in debris and in crevices in buildings or fence posts, it is reasonable to presume that contamination occurred by this means. A special effort is being made to eradicate this disease, so that this country can be declared free from it.

My officers have been called upon to deal with outbreaks of hog cholera in each province excepting New Brunswick and Prince Edward Island. The number of hogs slaughtered, however, has been very much smaller than for many years. The recent changes in our policy in dealing with this disease have not yet been in force for a sufficient length of time to obtain reliable statistics with regard to the economy in the slaughter of hogs in eradicating these outbreaks. I am of the opinion, however, that if the regulations governing the feeding of swine upon garbage or swill are effectively enforced the number of outbreaks of this disease will be considerably lessened.

The treatment with serum by my officers of apparently healthy contact hogs on infected premises has already resulted in a material saving to the hog owner. There have been very few fatalities among the serum-treated hogs and they have all been fattened for the block successfully, and upon slaughter a very large percentage found to be fit for food purposes. The hogs have consequently netted the owner much more than he would have received from the department if the animals had been slaughtered as contacts at the same time as the diseased ones. It is also interesting to find that the holding of these hogs under quarantine for periods ranging up to three months has not resulted in fresh outbreaks of the disease.

The greatest care has, of course, been exercised by the inspectors in dealing with these cases. The premises are very thoroughly disinfected directly the diseased hogs have been slaughtered. I am of the opinion, therefore, that the department is quite justified in anticipating far better results in the future, in dealing with this troublesome malady, under this progressive policy.

Rabies has fortunately not been detected in any part of the Dominion except the province of Ontario. In this province it has been limited to small areas. Quite recently an outbreak was reported near the United States boundary in the county of

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Welland, and in view of the danger of transmitting this disease to the human race, it was thought advisable to enforce a muzzling order covering one of the townships in this county. This action has had very satisfactory results, and the outbreak was promptly controlled. Although my inspectors were unable to find any definite evidence with regard to the origin of this outbreak, it is quite possible that the infection was brought over from United States territory, as this disease is known to exist in localities adjacent to the international boundary.

Outbreaks of anthrax have occasionally been reported in the provinces of Quebec and Ontario. These outbreaks, however, with very few exceptions, have occurred on old infected premises. It is quite evident that the protective vaccination, which is systematically practised on infected premises, is responsible for the limited number of these cases.

Blackquarter in young cattle continues to account for a large number of fatalities throughout the Dominion. This disease does not come under the operation of the Animal Contagious Diseases Act. The Department does, however, manufacture blackleg vaccine at the biological laboratory in this city, which is supplied at cost price to stock owners, upon request.

The problem of the control of bovine tuberculosis is unquestionably a most serious one. This disease is well known to be widely distributed throughout all civilized countries, and, generally speaking, stock owners are not yet prepared to co-operate with official bodies in the enforcement of any radical measures for its suppression.

While I am most anxious to follow a modern progressive policy in dealing with this disease, I fully appreciate the futility of endeavouring to enforce measures which would not meet with the hearty support of our stockmen. I have, therefore, followed the customary practice in so far as the testing of cattle is concerned and the supplying of tuberculin manufactured at our biological laboratory free of charge to veterinarians. There has been an increased demand for departmental tuberculin, a little over five thousand doses having been sent to veterinary practitioners upon the request of stockmen. Three hundred and fifty-three of the cattle tested with this tuberculin reacted and were permanently ear-marked by my officers. The inspectors of my department have, however, only tested eight hundred and five (805), and ninety-three (93) of these reacted, although during the previous year nearly three thousand more official tests were made.

The lack of interest shown by the stockmen in this connection is quite apparent when it is considered that although the department has for many years been prepared to take charge of herds with a view to the eradication of tuberculosis, for which no charge is made, there are at the present time not more than thirty herds under its supervision. This is the more surprising in view of the fact that no compulsory measures are taken in dealing with these herds. The owner is quite at liberty to keep reactors, provided they are constantly isolated, but the department insists upon supervising whatever disposal the owner may decide to make of these animals.

In view of the great economic and sanitary significance of bovine tuberculosis to the live-stock industry of this country, the Veterinary Director General and myself have given this question very serious thought. I fully realized, owing to the

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fact that public sentiment is not favourable for the adoption of drastic legislation, that suitable control measures must be developed in a progressive way. As the owner's co-operation in this work is without doubt a very essential feature of this great task, it has been necessary to bear in mind the condition of public sentiment and information on this subject, when arriving at a decision for definite action. After thoroughly going into the whole matter with the Veterinary Director General it was finally decided in the year 1914 to recommend to Council the passing of an order providing assistance to municipalities for the eradication of tuberculosis in the dairy herds. I considered that such a measure would be beneficial to the public interests in many ways, especially as it is well known that this disease can be transmitted to the human race through the consumption of milk and meat from tuberculous animals. This order was passed in May, 1914, but so far my department has only had the opportunity of assisting one municipality. The city of Saskatoon, Sask., was the first official body to take advantage of this order. A request for assistance has quite recently been received from the city of Regina, and the Veterinary Director General is at present arranging for the first test of the cattle supplying milk to that city.

The order in question applies only to cities or towns having a population of not less than 5,000 persons. The department further requires the municipalities to respect certain conditions which are essential to satisfactory work in dealing with this troublesome disease. All reactors must be immediately separated from the healthy animals. The cattle are tested free of charge as frequently as necessary, and the department insists upon the immediate slaughter of all reactors which, in the opinion of the inspector, are distributing the germs of the disease through the milk, faeces, or sputum. This class of animals is an exceptionally dangerous source of infection, and the sooner they are destroyed the better for all concerned. Compensation is, however, paid to the owners at the rate of one-half the appraised value of the cow. This value is limited by the Act to \$150 for pure-breds and \$60 for grades. In view of the circumstances, however, this is a very liberal remuneration, especially so as in many cases lesions are localized, and it is possible to obtain a fair salvage from a good percentage of the carcasses. The salvage obtained from the carcasses of these animals is given to the owner in addition to compensation, provided the salvage and compensation together do not exceed the maximum value provided by the Act.

Reactors which are not in the opinion of the inspector suffering from a dangerous form of the disease can be either slaughtered immediately, prepared for the block, or kept on the premises, and the milk or cream which they produce pasteurized before being offered for sale.

The department only allows one-third the appraised value for all reactors which are slaughtered at the request of the owner. To these cases the salvage is much higher, and the owner, therefore, receives a very fair return for any of the animals which are destroyed.

In the city of Saskatoon there were tested under this order approximately 1,250 cattle for the first time and the percentage of reactors marked was a little over six. These results are very encouraging, and it is especially gratifying to know that the city authorities and the dairyman are well satisfied with the enforcement of the order.

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I was glad to learn from the Veterinary Director General that he has received a communication from the city clerk, advising him that the city of Saskatoon appreciated the work of his branch. It is, therefore, evident that this order is a practical one and can be enforced without undue irritation and annoyance. Its more general enforcement which is sure to follow directly municipal authorities realize its true benefits will, I am satisfied, pave the way for some splendid work in the eradication of this disease.

The system of inspection of all foxes entering Prince Edward Island was changed early in the year in so far as our regulations now require that all foxes entering the island must be quarantined at Charlottetown only. Previous to the inauguration of this system owners could take their foxes to Charlottetown, Summerside, or Georgetown for thirty days' quarantine. It was, however, found advisable to eliminate the latter two points. There have been forty-six foxes brought on to the island during the past year, all having passed through the quarantine at Charlottetown. During this period no evidence of disease has been detected.

The pathologists in the laboratories at Agassiz, B.C., and Lethbridge, Alta., have been busily engaged in investigating the causes of diseases in their respective provinces, while the biological laboratory staff here has been occupied with the manufacture of vaccines, the analyses of disinfectants, and the examination of numerous specimens for diagnostic purposes.

The necessary repairs have been made to our quarantine buildings situated along the international boundary, but no new structures have been erected during the past year. It may, however, be advisable to erect accommodation in the near future at a few points where at present buildings are rented.

A good deal of work has, however, been accomplished at the Quebec Quarantine Station in connection with building good roads. This is the most important quarantine station in this country, as the majority of the most valuable animals from overseas undergo detention there. The department has, therefore, provided suitable sanitary accommodation, and as there is always a possibility of serious diseases being introduced, it is essential that no pains are spared in making this station modern in every respect.

Many of my officers have left important positions to serve their country in the European struggle, and I am proud to be able to say that Dr. Evans, of the Biological Laboratory staff here, has been awarded the Military Cross. The response to the call for recruits was so great that it threatened to disorganize the service. Much as I appreciate this sign of loyalty among my officers, it was nevertheless necessary, in view of the importance of enforcing suitable regulations for the protection of our live stock, to discourage the enlistment of those whose positions in the army could be suitably filled by individuals outside the service.

MEAT AND CANNED FOODS DIVISION.

The increase in the work of this division, mentioned in my last report, has continued. This is due, no doubt, to the European war. The demands for meat foods were never so great as at the present time, in consequence of which the prices being paid to the producer are very attractive.

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After a careful survey of the whole situation, it appears to me that the demand will continue, and that prices, if they change at all, will be inclined to go up rather than down.

The high price of bacon in England has caused our exports of that product to increase 50 per cent. This has caused a corresponding increase in the work of inspection in establishments operating under the provisions of the Meat and Canned Foods Act, which has been carried on by our regular staff. While our officers have been called upon to perform this extra amount of work without remuneration, they have done so without complaint, and in this way, while not in uniform at the front, they have done "their bit." Their loyalty and faithfulness in this time of stress is very much appreciated.

The killings for the year are approximately as follows:—

Cattle	538,000
Swine	2,355,000
Sheep	404,000
<hr/>	
Total	3,297,000

The sanitary condition of the plants has been very fair in view of the volume of business. Much new equipment has been installed, and changes and alterations have been made with the object of better sanitation.

Many rulings have been made and decisions given in connection with the work, which have facilitated matters and prevented friction between our officers and the management of inspected establishments.

The prospects are that this branch will have another busy year, which will in all probability necessitate further appointments to the staff.

The fruit and vegetable canneries were not nearly so busy as in previous years, this being due, no doubt, to the surplus pack of the year previous. Sanitary conditions were well maintained, while the quality of the raw material and of the finished product were equal to those of former packs.

The condensed and evaporated milk factories were operated as usual, and maintained their previous good record for cleanliness and the manufacture of a high-class food product.

FRUIT BRANCH

In order to keep in touch with the widely separated fruit-growing interests of the Dominion, the commissioner spent a good deal of his time in visiting the different districts. During the summer he took an extended trip to the West, interviewing the wholesale and retail dealers of the Prairie Provinces as to their needs. At Calgary he attended a three days' convention called by the Board of Trade for the purpose of discussing methods of increasing consumption, the cost of production and the cost of fruit to the consumer. Representatives of the grain growers' associations of the three Prairie Provinces, of the retail associations, Boards of Trade and consumers' leagues of the surrounding towns, and of the British Columbia Fruit Growers' Association, together with Government and railway officials, made this an

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important convention. In British Columbia, accompanied by our Chief Fruit Inspector Clarke, Mr. Johnson visited the leading growers and fruit associations of the various fruit-growing districts, and also inspected the basket and box manufacturing establishments of New Westminster. He also investigated the growing and marketing methods in Washington and Oregon and had an opportunity of studying some of the up-to-date systems which they employ so successfully in bringing their fruit before the commercial world. At San Francisco he saw Canadian fruit in competition with that of other countries, and was assured on all sides that there was no better collection anywhere than that displayed by this Dominion; in fact, so artistic and original was the display that it attracted the universal admiration of the visitors to the exposition. The deciduous fruit districts of California and the Kansas City and Chicago markets were also visited.

Later in the season the commissioner spent some time in New York state, which is the largest producing state in the Union, and which corresponds very closely to Ontario. While the commissioner found many excellent packs in New York state, yet he was convinced that the Inspection and Sale Act had done more for Canadian growers than was generally understood, as it caused a uniformity of pack which did not exist in the United States.

Numerous trips were also made to the commercial fruit districts of Ontario, Quebec, and Nova Scotia. Mr. Johnson was pleased to find that in almost every district the fruit trade declared its confidence in the fruit inspectors, and expressed appreciation of the help given in the standardization of the pack. He found that, owing to the inauguration of inspection at the point of shipment, a spirit of harmony existed between the inspectors and the growers which it was impossible to obtain under any other system.

THE FRUIT SEASON.

The apple season of 1915 will be remembered as one of low production and poor quality. These features were not in evidence until the latter part of the summer, when very heavy rains throughout the country superinduced the development of apple scab and other fungous diseases.

In the province of Ontario there was a very heavy blossom, but even in June there was no expectation of a large crop. Later in the season an almost incessant rainfall not only reduced the crop of apples actually produced but also rendered the quality of those remaining on the trees very poor indeed.

British Columbia produced a crop slightly above average, with the quality very much reduced by scab.

The Ontario peach crop was the largest ever produced. Grapes were reduced by mildew to about 65 per cent of a standard crop. Pears and plums were light.

FAULTS IN PACKING SMALL FRUITS.

In 1914, the fruit inspectors in the large city markets had found numerous violations of the Inspection and Sale Act; baskets of berries were often only three-quarters full and sometimes little more than half full; fruit was put into these pack-

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ages which was immature and utterly unfit for consumption; packages were overiced in many instances. Complaints were made, at that time, by the consuming public and by the wholesale and retail trade.

With the opening of the small fruit season in June, 1915, it became obvious that immediate steps be taken to avoid a repetition of this condition, by impressing upon the growers of these fruits the necessity of improving their system of packing. Inspectors were therefore sent out to visit the growers during the packing season, and do what they could to improve conditions. They found that almost all the above faults were due to ignorance on the part of the growers, and after the latter had received a warning letter from Ottawa and instructions from the inspector, the situation immediately improved. In fact the improvement was so complete and rapid that the wholesale fruit trade freely admitted that the small fruit season of 1915 was one of the most successful they had experienced in many years.

FRUIT CROP REPORTS.

These were published on the first day of each month, between June and October, inclusive, and were compiled from information received from fruit growers in all parts of the country. They dealt with every phase of the industry, but were chiefly devoted to the condition of the various fruits in the principal producing districts.

The success which had attended the publication in 1914, on a small scale, of telegraphic reports, warranted an extension of that work. Arrangements were made early in the year with prominent fruit growers, both in Canada and the United States, provincial officials, fruit inspectors, Canadian trade commissioners, and others, to send in telegrams and letters to reach Ottawa every Tuesday and Friday morning commencing August 17. These messages were summarized, printed, and distributed by mail the same day they were received, and were sent to about 1,200 fruit growers and distributors—in fact to anyone who expressed a desire to receive them. The information distributed in this way included the following:—

1. Crop conditions in producing districts.
2. Quantities and varieties of fruits ready for shipment.
3. Destination of shipment.
4. Wholesale prices in leading Canadian and British markets.
5. Condition of fruit at points of distribution.
6. Weather conditions.
7. Dates of steamship sailings.
8. Quantities of fruit in storage.
9. Advice to shippers, general information, etc.

The publication of these reports was continued until March 31, when sixty-eight had been sent out. The system has proved very successful and has met with the greatest support on the part of the fruit growers. There is no doubt that when the value of such information becomes better known there will be a large increase in our mailing list.

The Fruit Branch is very fortunate in having the assistance of the Department of Trade and Commerce, through whose trade commissioners we are enabled to keep in close touch with the British markets.

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In the autumn of 1915 the Department of Trade and Commerce created the office of Fruit Trade Commissioner for Great Britain, and appointed Mr. J. Forsyth Smith. Cables were sent direct to the Fruit Branch by Mr. Smith at frequent intervals after the beginning of the export fruit season, giving the sale price of all varieties of apples, and other information which could advantageously be embodied in the telegraphic reports.

The same system of crop reporting will be carried on next year, and a special effort made to give these reports more publicity and thereby widen their distribution. There are comparatively few fruit growers who know that such reports are published, and now that their usefulness is assured, efforts will be made to encourage a demand for them.

INSPECTION OF BASKET FACTORIES.

Complaints were made by the fruit growers during 1913 and 1914 regarding the poor quality and lack of uniformity in fruit packages manufactured in Ontario. It was suggested at the Fourth Conference of Fruit Growers in 1914 that steps should be taken to remedy the situation. An officer of the Fruit Branch therefore visited, in March and in April, 1915, all the factories operating in Ontario. Much improvement resulted, and as the season developed it was apparent that the strength and quality of the packages were better than in any previous season.

The main faults have been: (1) lack of uniformity in the size of veneer used at different factories, (2) inadequate nailing, and (3) the use of poor veneer. These faults were all corrected and further inspection will insure the purchase of fruit packages suitable to requirements.

INSPECTION WORK.

Previous to the season of 1914-15, practically all the examinations under the Inspection and Sale Act, Part IX, were made at the export and distributing points. This system has been most satisfactory as long as the original purpose of the Act (inspection of fruit for export) remained the more important work of our inspectors. With the widening of markets in the West, however, and the growth of a demand for inspection of fruit intended for domestic sale, some change in the method of inspection was necessary, as it was not practicable to enlarge our staff sufficiently to cover the innumerable consuming points. For many years the growers had been agitating for "inspection at point of shipment." They claimed that if their fruit was the only practicable method of protecting both the grower and the consumer rather than after it had travelled hundreds or thousands of miles and was beyond their control. After careful consideration the Fruit Commissioner decided that this was the only practicable method of protecting both the grower and the consumer and, as noted in my report of last year, inspection at shipping point was given a trial in Nova Scotia during the season 1914-15. Its success there led to an extension this year covering Ontario and British Columbia. In these provinces an increase in the staff had to be made to do the work, and ten additional temporary inspectors were employed for a period of some two months.

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Inspection at point of shipment has proved so satisfactory that it will be further extended during the coming season. Under the new system, the greater part of the inspection work is done in the orchards and packing houses, and thus our inspectors combine instruction and inspection. During the past season they have been able to assist the packers and shippers in all matters pertaining to the grading, packing, and loading of fruit. Notwithstanding the fact that the crop last year was short and generally of poor quality, making the temptation to pack and grade dishonestly greater than usual, the bulk of the fruit which appeared upon the market was packed and graded in accordance with the provisions of the law, and this I consider may be fairly attributed to the presence of our inspectors in the shipping district.

During the past season the appointment of several of the inspectors in southern Ontario was authorized somewhat earlier than usual in order that special attention might be given to the packing of early fruits. The effect of their work and the result of the twenty-one convictions secured in connection with the overfacing of strawberries, currants, peaches, etc., will doubtless be the adoption of a higher standard in the packing of these fruits.

While the permanent staff of inspectors remained the same as last year, it was necessary as noted above, to appoint some additional temporary inspectors, who were employed for a period of from two to two and a half months in the producing districts.

PROSECUTIONS.

The convictions secured under Part IX of the Inspection and Sale Act were 103 as compared with 78 during 1914-15. While the number is greater this season than last, this does not necessarily mean a retrograde step in the packing and grading of our fruit. There were ten more convictions this year than last with respect to imported fruit and, in addition, twenty-one of the above convictions were in connection with basket fruits, which this season have received more attention from our inspectors than ever before. The prosecutions were as follows:—

Imported fruit.. . . .	25
British Columbia	2
Ontario	48
Quebec	16
Nova Scotia.. . . .	10
Total.. . . .	103

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INSPECTION STATISTICS.

The following table gives comparative statements of the number of lots inspected and the number of packages inspected for the season 1908-9—1915-16 inclusive:—

Variety.	Number of lots inspected.	Number of packages in lots inspected.	Number of packages inspected.
1908-9.			
Apples..... brls.	9,940	682,657	42,223
"..... boxes.	248	100,792	2,701
Pears..... "	88	54,150	7,924
Peaches..... "	91	140,976	16,005
Plums..... baskets.	54	16,505	1,474
Tomatoes..... "	53	11,381	779
Small Fruits..... quarts.	863	1,184,651	154,874
Total.....			225,980
1909-10.			
Apples..... brls.	7,736	859,572	63,232
"..... boxes.	902	157,939	7,363
Pears..... "	248	31,459	2,738
Peaches..... "	410	60,248	3,817
Plums..... baskets.	264	62,883	4,257
Tomatoes..... "	149	50,043	3,241
Apricots..... boxes.	11	12,495	481
Small fruits..... quarts.	2,491	2,310,264	240,751
Total.....			325,880
1910-11.			
Apples..... brls.	4,527	360,768	26,890
"..... boxes.	1,347	234,182	9,829
"..... baskets.	171	17,551	10,393
Pears..... boxes.	371	40,681	2,750
Peaches..... "	11	2,269	36
"..... baskets.	383	70,564	5,932
Tomatoes..... "	56	6,570	601
Plums..... "	189	50,575	5,144
Small fruits..... quarts.	1,502	568,510	155,048
Total.....			216,623
1911-12.			
Apples..... brls.	13,548	1,085,300	67,706
"..... boxes.	1,235	162,249	10,178
Pears..... "	389	32,252	2,655
Peaches..... "	38	3,487	268
"..... baskets.	365	34,606	2,864
Plums..... "	336	88,894	7,554
Tomatoes..... "	66	48,530	2,012
Small fruits..... quarts.	2,120	2,729,143	298,591
Total.....			391,828
1912-13.			
Apples..... brls.	18,457	1,321,440	80,102
"..... boxes.	2,101	204,971	33,578
"..... baskets.	119	16,249	2,719
Crab apples..... boxes.	62	12,186	695
"..... baskets.	17	1,395	660
Pears..... boxes.	272	36,356	2,202
Peaches..... "	65	25,592	1,557
"..... baskets.	121	18,837	2,139
Plums..... "	186	67,751	7,254
Tomatoes..... "	264	39,174	9,940
Small fruits..... quarts.	1,187	2,264,559	172,945
Total.....			310,791

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Variety.		Number of lots inspected.	Number of packages in lots inspected.	Number of packages inspected.
1913-14.				
Apples.....	brls.	11,725	799,510	59,643
".....	boxes.	2,631	341,679	29,879
".....	baskets.	105	11,908	1,219
Crab apples.....	boxes.	192	13,250	1,462
Pears.....	"	977	48,274	8,559
Peaches.....	"	806	35,494	12,657
".....	baskets.	353	60,771	7,554
Plums.....	"	679	133,159	15,200
Tomatoes.....	"	173	59,707	8,305
Small fruits.....	quarts.	736	1,128,907	95,841
Total.....				239,329
1914-15.				
Apples.....	brls.	8,926	765,445	59,602
".....	boxes.	2,769	457,055	36,118
".....	baskets.	191	29,476	3,994
Crab apples.....	boxes.	38	2,443	951
Pears.....	"	894	91,121	9,790
Peaches.....	"	735	183,952	10,045
".....	baskets.	147	17,797	2,422
Plums.....	"	643	180,154	12,254
Tomatoes.....	"	305	103,742	12,171
Small fruits.....	quarts.	1,162	1,529,568	151,559
Grapes.....	baskets.	244	308,728	22,844
Total....				321,390
1915-16.				
Apples.....	brls.	8,882	710,858	60,248
".....	boxes.	4,297	756,227	45,791
".....	baskets.	204	14,319	1,797
Pears.....	boxes.	1,062	121,414	8,816
Peaches.....	"	1,022	270,508	12,675
".....	baskets.	838	106,602	10,196
Plums.....	"	998	482,416	22,221
Tomatoes.....	"	637	200,343	7,926
Small fruits.....	quarts.	1,724	2,670,984	276,254
Grapes.....	baskets.	200	282,322	11,905
Total.....				467,899

PUBLICITY.

During the past season this branch undertook a special campaign with the object of increasing the home consumption of Canadian fruit. It was obvious that, on account of the conditions existing in Great Britain and Europe there would be a restricted demand in those countries for fruit. More than that, there was also certain to be difficulty in securing vessel space for exporting apples, owing to the fact that ships were being commandeered at short notice by the British Government. These circumstances were sufficient to emphasize the necessity of increasing consumption in this country.

It was thought, too, that a certain degree of publicity was needed in order to educate the public as to: (1) the uses of certain kinds of fruits, (2) the names of varieties, (3) the period during which certain apples were in the best condition, (4) dates of shipment, and (5) methods of preserving. These features had never been brought to public attention, and consequently several unnecessary situations

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had arisen in former years. Householders had been uncertain as to the proper date upon which to purchase their stock for preserving, and had often delayed until some varieties were either off the market or too high in price. It was also noticeable that the more popular apples, such as the Northern Spy, were so much in demand that the sale of other varieties, which were quite as good in quality, was very limited.

By judicious advertising, these and other situations were dealt with, and at the same time the merits of Canadian fruit were sufficiently made known to increase consumption and also to sustain a sale at very satisfactory prices.

APPLE PRODUCTION IN ONTARIO IN 1915.

Owing to the number of inquiries which we receive from time to time regarding the quantity of apples produced in Ontario, a special effort was made this year to secure that information. The freight departments of the various railways operating in Ontario were kind enough to give their assistance, and in this way we were able to secure from all their stations the quantity of apples shipped. In addition to this it was necessary, in order to arrive at an estimate of the total quantity marketed, to secure from the evaporators and canning factories figures showing the tonnage used by them. The information we have gathered together in this way is, we think, as accurate as can be obtained by any means. Next year we propose to secure this information monthly during the shipping season so that the railways and others concerned will have less difficulty in compiling the necessary figures. Similar information will also be received from the other fruit-growing provinces.

Last season the production of apples in Ontario, based on the quantities carried by the railroads of Ontario, and used by the evaporators and canning factories, amounted to 6,286 cars. This does not include any fruit consumed in the local markets of producing districts.

It is only fair to add that the Ontario apple crop in 1915 was not, in our opinion, more than 40 per cent of an average crop.

CANADIAN FRUIT AT EXPOSITION.

In connection with the Panama Exposition held at San Francisco during 1915, Canada sent 2,000 boxes of apples. This fruit was collected from all provinces of the Dominion early in the season of 1914, carefully packed and shipped in insulated refrigerator cars to prevent any danger of damage by frost.

During the course of the exposition many reports were received regarding the quality and appearance of the Canadian fruit exhibit, and the consensus of these was that it surpassed in every way all the other exhibits.

Late in the season of 1915 the fruit commissioner received instructions to be prepared to ship one thousand additional boxes of apples to San Diego. Owing to the fact that practically all of the better grades had already been marketed, it was impossible to secure the required quantity in Ontario. The province of British Columbia furnished 450 boxes, and the balance of the exhibit at San Francisco was re-packed to furnish the remainder. The fruit arrived at San Diego in excellent condition, and was most satisfactory.

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MEETINGS, ETC.

In addition to their regular inspection duties, the fruit inspectors and other members of the staff assisted at numerous meetings, and in many cases acted as judges of fruit at local fairs and exhibitions. P. J. Carey, the apple-packing expert of the department, continues to do good work in connection with demonstrations.

In order to secure what we could consider reliable information as to the production and marketing problems in the West, Mr. A. H. Flack, Chief Fruit Inspector for the Prairie Provinces, was instructed to spend some time in British Columbia and Washington during the harvesting and marketing season, for the purpose of going into the details of production and marketing. In this he was able to secure a great deal of most valuable information which has given us an insight into the requirements of those markets and into the up-to-date methods employed by the most progressive fruit growers of the Pacific Coast.

ENTOMOLOGICAL BRANCH.

The work of this branch has comprised the administration of the Insects and Pests Regulations of the Destructive Insect and Pest Act; the suppression of the brown-tail moth in Nova Scotia and New Brunswick and the introduction of its parasitic and predaceous insect enemies and those of the gipsy moth into Eastern Canada; the conducting of investigations upon insects affecting farm, garden, and orchard crops, forest and shade trees, domestic and other animals, household and public health, mills and stored products, and the answering of inquiries and giving of advice concerning the control of such insects; the naming of collections of insects for institutions and individuals; and the administration of an appropriation of the Department of Indian Affairs for the care of the orchards on the Indian reservations in British Columbia. In addition the Dominion Entomologist has been called upon to advise on questions relating to the protection of birds and the conservation of our wild life generally, in the interests of which he has been active.

Under the Destructive Insect and Pest Act, nursery stock originating in countries in which the San José Scale occurs was fumigated at our various fumigation stations. During the year an arrangement was concluded with the Government of the province of Nova Scotia whereby they undertook to fumigate, under the supervision of my officer, foreign nursery stock, and accordingly, Truro, N.S., and Digby, N.S., were declared ports of entry for such nursery stock by Order in Council on August 18, 1915. During the statutory importation season of 1914-15, 2,358,852 imported trees and plants originating in Europe, Japan, and the New England States, were inspected for gipsy and brown-tail moths and other foreign insect pests to which they are subject. Owing to the disturbed conditions in Europe, particularly in Belgium and France from which we are accustomed to import the larger portion of our nursery and florists' stock, the number of plants imported during the season 1914-15 was about half of the number imported during the previous season.

The brown-tail moth situation in Nova Scotia and New Brunswick is in a satisfactory condition. In spite of an increase of the infested area, owing to the

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spread of the adult insects from the New England States, the intensity of the infestation has been decreased in both provinces by the careful work of the officers in charge. The careful scouting carried out each winter has prevented the establishment of the insect in New Brunswick and any serious increase of infestation in Nova Scotia. I am pleased to take this opportunity of acknowledging the continued co-operation of the Provincial Governments, who employ half the number of men engaged on this work under the direction of my officers.

Fortunately, the gipsy moth has not yet reached Canada, although in its northerly spread in Maine it has now arrived within fifty miles of the international boundary, and its arrival in New Brunswick is merely a matter of time.

In order to be prepared for the arrival of the gipsy moth and to assist in establishing a natural control of the brown-tail moth, we have continued the importation of the parasitic and predaceous insect enemies of these pests from the New England States, which work has been possible through the co-operation of the United States Department of Agriculture. The insects were collected in Massachusetts and the parasites were reared by my officers at the gipsy moth laboratory, Melrose Highlands, Mass., and shipped to our entomological laboratory at Fredericton, N.B., from which point they were taken and placed at strategical points in the provinces of Nova Scotia, New Brunswick and Quebec. Up to date over 72,000 parasites and 3,400 predaceous beetles have been imported and liberated.

The success of the work of the trained field officers in charge of the entomological field laboratories in different parts of the Dominion, and the demand on the part of the agriculturists for further assistance in controlling insect pests and outbreaks, rendered it necessary to place a further number of these laboratories on a permanent basis by erecting permanent buildings to take the place of the small temporary buildings which had hitherto served as headquarters for the work. Entomological laboratories providing adequate accommodation for the officers and the work that they are carrying on were erected during 1915 at the following places:—Annapolis Royal, N.S., on a site provided by the town of Annapolis Royal; Fredericton, N.B., on a site provided by the University of New Brunswick; Treesbank, Man., on a site provided by Mr. Percy Criddle; and Lethbridge, Alta., on the Experimental Farm. The co-operation of the authorities and gentleman mentioned is greatly appreciated.

The following is a list of the entomological field laboratories showing the investigations that are being carried on by my officers in charge:—

Annapolis Royal, N.S.—Investigations on the brown-tail moth, the introduction and breeding of its parasites and control work. The control of the budmoth and green fruit-worms of apple, including experimental work under orchard conditions in the Annapolis Valley. Comparative tests of insecticides. The conducting of an energetic campaign for more spraying.

Fredericton, N.B.—Control work and investigations on the brown-tail moth and the introduction and establishment of the parasitic and predaceous enemies of this insect and the gipsy moth. An investigation on the means by which the natural control of the tent caterpillar, fall webworm, and spruce budworm is effected.

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Hemmingford, Que.—The control of apple insects and orchard spraying. Experiments on the control of locusts by bacterial disease.

Vineland Station, Ont.—A detailed study of aphids affecting apple. The continuation of the apple maggot investigation. The control of insects affecting bush fruits, and greenhouse and mill-infesting insects.

Strathroy, Ont.—Investigation of white grubs, and insects affecting shade trees and wood-lots.

Treesbank, Man.—The investigation of white grubs and of insects affecting cereal crops, particularly the Osecinidæ or grass stem-maggots.

Lethbridge, Alta.—The study of the army cutworm and its control with demonstration work in the field. Investigation of the parasites affecting cutworms. Observations on Nematodes.

Agassiz, B.C.—Biological studies of the root maggots and their control. Continuation of the work on the wheat midge and on fruit insects. Discovery of the pear thrips and black currant bud mite.

Vancouver, B.C.—The investigation of the insects affecting coniferous trees in Stanley park. A study of *Chermes* and their alternate hosts: bark beetles and other forest insects.

The progress that has been made in our investigations on insects affecting fruit has been very gratifying, and productive of practical results of great value to fruit-growers.

In Eastern Canada locusts were very abundant and injurious. The timely publication of Entomological Circular No. 5, giving the results of our successful experiments on the control of these insects, was the means of preventing serious losses in many cases where the remedies were applied. In a number of instances the farmers co-operated and distributed the poisoned bait over large areas of infested land with complete success. Serious outbreaks of cutworms occurred throughout Canada in 1915, the provinces of Manitoba and Saskatchewan being most severely infested; hundreds of acres of wheat and oats were destroyed, and garden vegetables were freely attacked. In southern Alberta an extensive outbreak of the army cutworm occurred, covering an area of about 3,000 square miles. Our resident officer immediately took the matter in hand, discovered means of controlling the spread of these insects, and by means of field demonstrations and press notices was able to prevent widespread damage. In Ontario and Manitoba satisfactory progress was made in the investigation that we are conducting on white grubs. In Manitoba we have commenced a study of the stem-maggot flies (Osecinidæ) which affect grasses and cereals. An account has been prepared for publication of the investigations that have been carried on in Ontario and British Columbia for a number of years on the control of root maggots. Much work has also been accomplished in the study of miscellaneous insects affecting field crops.

The work on insects affecting forest and shade trees has been advanced, and a large amount of data of practical value have been secured. In British Columbia the

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investigations of the preceding years were continued, particularly in Stanley park, Vancouver, and advice based on these studies on the control of the insects responsible for the damage in the latter area was given to the Board of Park Commissioners. A serious type of injury in cedars on the Pacific coast was found and is being studied. On accounts of reports of dying timber in the Lesser Slave Lake region, an investigation into the causes of this injury was made by my officers and the nature and habits of the destructive species of bark-beetles and wood borers were studied with very profitable results. Forest insects were also studied in Jasper park and certain of the other national parks.

During the year further progress was made in an investigation of insects affecting greenhouses and florists' stock.

Insects affecting public health, household, and live-stock have also been studied. The educational campaign against the house-fly has been continued, and further experiments on its control have been carried out. A catalogue of the ticks of Canada has been prepared and published in the *Transactions of the Royal Society of Canada*.

An investigation on insects infesting elevators, flour mills, granaries and stored products has been commenced during the year, and mills in Montreal, Toronto, Winnipeg, and Calgary have been visited. Few people realize the enormous annual cost entailed in taking steps to control this class of insects in Canada where large amounts of grain are dealt with.

The following publications have been issued during the year:—

Cutworms and their Control. By Arthur Gibson. Entomological Bulletin No. 10; 31 pp., 20 figs. 1915.

The Hessian-Fly and the Western Wheat-stem Sawfly in Manitoba, Saskatchewan, and Alberta. By N. Criddle. Entomological Bulletin No. 11; 23 pp., 4 figs. 1915.

The Control of Locusts in Eastern Canada. By Arthur Gibson. Entomological Circular No. 5, 8 pp., 6 figs. 1915.

The Control of Cutworms in the Prairie Provinces. By E. H. Strickland. Entomological Circular No. 6, 8 pp., 5 figs. 1916.

Results from Spraying in Nova Scotia. By G. E. Sanders and W. H. Brittain. Entomological Circular No. 7, 11 pp. 1916.

Report of the Dominion Entomologist for the year ending March 31, 1915, 40 pp., 4 figs., 1 map. 1915.

In addition, the officers of the branch have contributed papers embodying the more technical results of their work to *The Canadian Entomologist* and other scientific journals. Articles have also been contributed each month to *The Agricultural Gazette of Canada*, and in a number of cases reprints of these articles were issued.

Considerable additions have been made during the year to the National Collection of insects, and we are grateful to Dr. J. M. Aldrich, and other specialists in various orders, for their assistance in the classification and determination of our collections.

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BRANCH OF THE CANADIAN COMMISSIONER OF THE INTERNATIONAL INSTITUTE OF AGRICULTURE.

May, 1915, when Italy joined the Allies, was a critical moment for the institute. The tension in Rome became great, and the difficulties of carrying on the work of the institute increased. The delegates for Austria and Hungary left Rome, and the members of the staff who belonged to these countries and to Germany also found it advisable to leave. Up to August, forty-seven members of the permanent staff, which ordinarily consisted of one hundred, had to leave either because they had been summoned to serve in a military capacity or belonged to countries at war with Italy. In consequence of the closing of the Italian frontiers to the mails coming from Germany and Austria-Hungary, an arrangement was made with the institute's official correspondent for Switzerland, Dr. Laur, by means of which the periodical publications intended for the institute were addressed to him, and abstracts from them made under his direction and forwarded to Rome for publication.

The delegate for Germany on the Permanent Committee, while unwilling to acquiesce in the arrangement proposed by the Italian Government for his uninterrupted collaboration on the Permanent Committee as a resident of Rome, continued after his return to Germany to take an active interest in securing, as far as possible, the regular publication of the German edition of the two large monthly bulletins. The translation and printing of the German edition have been done in Germany under his direction, with the assistance of German employees of the institute returned to that country. Hungary continued its representation on the Permanent Committee through the delegate for Sweden, Baron de Bildt.

Notwithstanding the depletion of the staff at Rome, the regular work of the institute has been continuously carried on with commendable punctuality, very largely due to the ability, tact, and untiring efforts of the president, Marchese Cappelli, and the members of the Permanent Committee, in collaboration with him and with the institute staff. The difficulties of the task were increased because of the inclusion among the absentees of: two chiefs of service, viz., Dr. Herms, of Germany, Podmanizky, of Hungary; the librarian, Secretary-General Professor Lorenzoni; and twenty-three of the forty-seven editors. Professor Lorenzoni, a native of the Trentino, Austria, who elected to serve in the Italian armies, has again returned to his post. Employees at the various battle fronts were to be allowed during their enforced absence a maximum of six months' pay, and to be permitted, in so far as possible, to resume their duties at the institute on the conclusion of peace.

The financial situation continues sound, notwithstanding some fears at first felt owing to an accumulation of arrears from the non-payment of contributions by certain countries. A considerable proportion of the arrears has recently been paid, the expenses have been notably reduced, and a reserve accumulated which, at the close of 1915, was estimated approximately at \$150,000, on which it will be possible to draw in case of need.

At the end of December, publication of the "Bibliographic Bulletin" was discontinued, owing chiefly to a considerable decrease in the number of books received

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and the irregularity of their transmission through the mails. The other three monthly bulletins have been issued with commendable regularity.

New features have been introduced into the "International Year Book of Agricultural Statistics," issued in August, 1915, for the years 1913 and 1914. Area, production and trade in cereals, together with the numbers of live stock, are dealt with in five and ten-year periods. The tables of imports and exports are given by country of origin and country of destination, for all cereals and for cotton, details which previously had been furnished for wheat only. A new chapter gives cash prices, on a certain day of the week, of the principal grades of cereals on the most important world's markets for the years 1913 and 1914. There are added, moreover, tables on the production, international commerce, and prices of fertilizers and chemical products useful to agriculture.

A half-yearly summary entitled "Statistical Notes on the Yield, Consumption, and Prices of Cereals, with Rates of Ocean freight" is now published and sent out along with the "Bulletin of Agricultural and Commercial Statistics" in March and September. This new feature is of great practical value, especially comprising as it does the prices expressed in gold francs per quintal based on the rate of exchange in London. It permits an exact comparison to be made between the leading world's markets.

At a meeting of the Permanent Committee held in December a scheme was approved for the publication of an annual review of the international movement of concentrated feeding stuffs, so far as information on the subject is officially available.

One of the institute's services of primary importance is the preparation of the "Year Book of International Legislation," of which the fourth issue appeared in August. In order to better realize the idea of presenting a faithful record of the world's agricultural legislation, there was an analytical introduction of some sixty pages, which will be of the greatest practical assistance to busy legislators who might desire to make this Year Book a convenient manual. For future editions the institute have decided to publish translations into five different languages of the analytical introduction. In the meantime, the Institute Branch is about to publish in the "Bulletin of Foreign Agricultural Intelligence" a translation into English of the introduction to the current issue, which is for the legislation of 1914.

In accordance with the desire of the representatives of the English-speaking countries, it was resolved to adopt new titles for the English editions of the three monthly bulletins, more intelligible to English readers than those previously used, and which are too close translations of the French. The new titles, with mention of the old in parenthesis, are the following:—

(1) International Crop Report and Agricultural Statistics. (Bulletin of Agricultural and Commercial Statistics.)

(2) International Review of the Science and Practice of Agriculture. (Bulletin of Agricultural Intelligence and Plant Diseases.)

(3) International Review of Agricultural Economics. (Bulletin of Economic and Social Intelligence.)

Reference was made in the last annual report to the initiative taken at the

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institute in 1914 by the delegate for the United States, Mr. David Lubin, supported by an Act of Congress, advocating the establishment of an International Commerce Commission having consultative, deliberative, and advisory powers regarding ocean trade and ocean freights. The following is a brief outline of the report which is being drawn up under the direct supervision of the secretary general on ocean freight rates, with special reference to the carriage of wheat, cotton, and sugar, for presentation at the next session of the General Assembly:—

I.—CONDITIONS BEFORE THE OUTBREAK OF WAR.

1. The leading transoceanic trade routes for the above three products.
2. The organization of ocean carriage.
3. The formation of freight rates:—
 - (a) The factors which determine the cost price of freights.
 - (b) The factors which determine fluctuations in freight rates above or below cost price. The play of supply and demand. Speculation.
 - (c) Efforts aiming at the reduction of said fluctuations and at conferring greater stability on freight rates:—
 - (1) Measures taken as the result of private action;
 - (2) Proposals for government action.

II.—CONDITIONS SINCE THE OUTBREAK OF WAR.

1. Increase of freight rates during the war and causes of such increase.
2. Government intervention to moderate or control the rise in freights.

III.—STATISTICAL TABLES.

1. Transoceanic imports and exports for the three products selected during a period of ten years.
2. Variations in freight rates from the leading export and import ports for the three selected products and according to the different kinds of transport organizations, before the war, for a period of ten years, i.e., from 1904 to 1914.
3. Variations in freight rates from the leading export and import ports for the three selected products, and according to the different kinds of transport organizations, since the war, i.e., from the 1st August, 1914, to 31st July, 1916

The Canadian office is charged with furnishing to the institute the information required concerning Canada, and with republishing in Canada the information contained in the official bulletins, together with other information of a technical character derived from other foreign sources. This work is done through the monthly "Bulletin of Foreign Agricultural Intelligence," the distribution of which has increased during the past year from 12,600 to 13,800.

Prominent among the articles of the year were those entitled "Some Common Birds Useful to the Farmer," "How to Attract Birds—Bird Sanctuaries," "A Preliminary Census of Birds in the United States," "Flax Growing," "Flax Retting and Process," "Fibre Flax Growing." There were five articles, translated from the French in the office of the branch, setting forth the Russian system of meteorology as applied to agriculture, and defining especially "critical periods" of rainfall in respect to the stages of growth of the various cereals. These meteorological articles were published in intimate collaboration with the Agricultural Division of the

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Dominion Meteorological Station, Toronto—as a sequel to the long article published in the May number entitled: “Weather Wisdom in Agriculture”—and are based on Professor Broounoff’s investigations covering a period of over fifteen years. The information, although designed more particularly for the different local meteorological stations and crop correspondents, cannot fail to be of assistance to farmers desirous of adapting their crops and methods of cultivation to weather conditions.

A great number of inquiries were made by readers for greater details than are contained in the summary articles published in the bulletin. Such inquiries, for instance, with reference to new methods, new machines, seeds of new plants, etc., have led to investigations, through correspondence with foreign countries and experiments in Canada, that give promise of beneficial results. Much of the information desired in such cases has been furnished by this branch from the original publications from which the institute summaries had been abstracted, and which are communicated to the library of this branch as well as to the institute library at Rome by practically all the Governments of the world.

A practice has been introduced of reviewing new books on agriculture for the purpose of inviting the attention of farmers to any they might consider of practical use of them. To the statistical division of the bulletin were added the prices of cereals at the leading world’s markets, also the imports and exports of cereals.

During the fiscal year 1915-16 there were added to the library 952 bound books and 6,152 unbound books and pamphlets, making a total, on April 1, of 2,838 bound books and 23,102 unbound books and pamphlets.

Printed catalogue cards to the number of 11,381 have also been received and filed. They are the following:—

1,956 cards representing the publications of the United States Department of Agriculture.

1,000 cards representing the publications of the United States Experiment Stations.

8,425 cards representing the accessions of the Library of the United States Department of Agriculture and the Library of Congress referring to agriculture.

The total number of cards available for consultation is approximately 160,000, including a large proportion of cards prepared and typed in the library. A catalogue of all the publications purchased by the department for the use of the various branches has been maintained. There have been compiled during the year a number of bibliographies, whose value has been acknowledged by commissions and by expert officials of this and other departments desiring special information.

THE PUBLICATIONS BRANCH.

An important feature of the operations of the Publications Branch during the past year was the rapid growth of the mailing lists. Applications averaging almost one thousand a week throughout the year were received and added to the lists. A corresponding increase took place in the number of copies of publications sent out. These amounted to 3,091,435 copies, exceeding the number for the previous year by 1,284,981 pieces.

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During the year there were mailed to those on the respective lists, and in response to individual requests, upwards of ninety new publications of this department and small editions of three monthly bulletins issued by the International Agricultural Institute at Rome. The publications thus distributed included the annual reports of the Minister, the Experimental Farms, the Branch of the Dairy and Cold Storage Commissioner, the Seed Commissioner, the Veterinary Director General, the Dominion Entomologist, the Canadian Record of Performance, the Canadian Seed Growers' Association, and the Report of the Proceedings of the Fourth Conference of the Fruit Growers of Canada. Besides these there were issued eight bulletins of the Experimental Farms; three of the Health of Animals Branch; four of the Dairy and Cold Storage Branch; one of the Fruit Branch; two of the Live Stock Branch; three of the Seed Branch; three of the Entomological Branch; eleven pamphlets and a large number of circulars and leaflets issued by the various branches of the department. The distribution also included *The Agricultural Gazette* and other periodical publications noted in the table below.

The following table shows the number of copies mailed during the year to persons on the mailing lists and in response to requests:—

	Mailing lists	Requests
Reports	229,321	18,816
Bulletins	978,000	50,750
Seasonable Hints	823,000	7,700
Pamphlets	170,080	35,000
Circulars	477,975	19,820
Leaflets		14,000
The Agricultural Gazette	61,401	2,915
Bulletin of Foreign Agricultural Intelligence	144,000	8,300
Bulletin Agricultural Institute (Original)	9,004	1,170
War Book of 1915		12,719
Total	2,882,648	172,511

In addition, there were sent out in small bulk lots to branch Experimental Farms and Stations, agricultural, educational, and other institutions, 36,540 copies, chiefly of bulletins, pamphlets, and circulars.

The addressing of envelopes for the mailing list is done by machinery. Hand addressing is required for publications sent in response to individual request. During the year, 2,341,440 envelopes were machine addressed, nearly six thousand addresses were changed, and 7,319 names removed from the lists.

Early in the year a reclassification of the mailing lists was undertaken. The object was to provide combinations of lists so arranged that a publication may be sent to any number of the subject lists without causing duplication. The new system was fully explained in *The Agricultural Gazette of Canada* for November, 1918. The transfer of names from the old to the new system is in progress.

During the year a large number of newspaper articles were written and sent out. These included press notices of publications issued by this department and of articles issued in connection with the "Patriotism and Production" and "Production and Thrift" campaigns.

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The editing and publishing of *The Agricultural Gazette* of Canada has occupied much of the time of the chief officer and his assistant editors. The policy of distributing *The Agricultural Gazette*, outlined in this report for last year, has been followed during the year just closed.

The staff employed in the branch included twenty permanent and seven temporary employees, made up of fourteen clerks, four messengers, and nine packers.

III. PATENTS OF INVENTION.

The following tables show the transactions of the Patent Office, Department of Agriculture, from April, 1915, to March 31, 1916:—

Applications for Patents.	Patents and Certificates Granted.			Caveats.	Assignments of Patents.	Notices under Sec. 8.
	Patents.	Certificates.	Total.			
7,793	6,812	1,419	8,231	419	3,311	1,026

DETAILED STATEMENT PATENT OFFICE FEES FOR YEAR 1915-16.

Month.	Notices.	Patents.	Assign- ments.	Certified copies.	Caveats.	Sundries.	Subscrip- tion.	Total.
1915.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
April.....	147 95	16,534 75	677 39	249 20	257 00	12 45	118 85	17,997 59
May	153 00	16,128 25	689 30	200 30	180 00	39 25	24 10	17,414 20
June ...	208 00	15,004 35	600 75	167 10	235 25	5 26	21 30	16,242 01
July.....	192 00	15,381 60	528 35	152 01	145 10	35 00	13 20	16,447 26
August.....	218 00	14,321 60	517 20	196 30	109 90	7 05	8 45	15,378 50
September.....	142 90	13,453 65	520 00	209 87	172 05	3 00	28 80	14,530 27
October.....	156 15	14,758 70	516 00	280 40	167 95	12 00	13 70	15,904 90
November	142 00	13,454 45	727 70	272 65	200 00	18 50	59 60	14,874 90
December.	148 00	15,117 62	745 25	243 30	185 25	27 15	24 30	16,490 87
1916.								
January	183 00	16,455 15	658 05	230 91	175 40	9 00	40 05	17,751 56
February	182 40	16,117 75	1,502 10	170 05	191 00	13 20	167 63	18,344 13
March	179 90	19,622 00	754 55	253 06	186 00	60 10	198 60	21,254 21
	2,053 30	186,349 87	8,436 64	2,625 15	2,204 90	241 96	718 58	202,630 40

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NATIONALITY OF INVENTORS.

Countries.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
United States of America..	5,021	4,885	4,997	4,964	5,220	4,645	4,972
Great Britain and Ireland.....	392	359	506	495	558	450	360
*Germany.....	241	304	336	307	300	107	14
Australia	60	77	99	75	76	76	76
France	75	97	108	100	115	83	55
New Zealand.....	37	33	46	47	50	29	31
Sweden.....	39	54	52	64	40	40	44
Belgium.....	20	25	20	23	33	19	21
Austria.....	23	20	24	40	35	11	0
Italy.....	8	12	6	16	14	15	8
Switzerland.....	12	26	23	20	22	14	22
Denmark.....	8	5	14	15	16	11	12
Transvaal.....	12	16	10	7	1	3	3
Hungary.....	7	6	6	6	5	5	0
Russia.....	14	18	6	17	13	9	5
Norway.....	18	20	17	10	32	24	20
Newfoundland.....	2	3	1	2	1	1	1
Netherlands.....	0	0	.....	.....	7	4	2
Mexico.....	11	7	10	8	7	4	4
Cape Province	0	3	4	4	1	0	0
Cuba	1	5	1	1	2	3	0
Spain	1	3	.....	.....	1	1	3
Chile.....	0	1	.....	1	0	0	1
Finland.....	0	1	.....	1	0	0	0
Portugal	0	0	.....	.....	0	1	0
Roumania.....	0	1	1	.....	0	1	0
Grand Duchy of Luxemburg.....	0	0	.....	.....	0	3	0
Algeria	0	1	.....	.....	0	0	0
Japan.....	2	0	2	2	1	3	2
India.....	0	5	3	1	7	3	0
Natal	0	0	1	2	0	0	1
Nicaragua.....	0	1	.....	.....	0	0	0
Brazil	0	2	1	.....	1	3	0
Turkey.....	0	0	.....	.....	0	0	0
Poland	2	0	.....	.....	0	0	0
Holland.....	2	11	8	7	8	5	2
Argentine Republic.....	5	1	1	.....	2	3	3
Panama (Canal Zone).....	0	0	3	.....	3	0	1
Egypt.....	1	1	.....	.....	1	1	0
Southern Rhodesia.....	1	.....	.....	.....	0	0	2
Peru .....	.....	.....	3	2	0	0	0
Hawaii.....	.....	.....	3	3	0	0	2
Venezuela.....	.....	.....	2	1	1	0	0
Trinidad .....	.....	.....	1	.....	0	0	0
Porto Rico.....	.....	.....	1	2	0	0	0
Tunis.....	.....	.....	.....	1	0	0	0
Ceylon .....	.....	.....	.....	1	0	0	0
Straits Settlements.....	.....	.....	.....	1	0	0	0
Philippine Islands.....	.....	.....	.....	.....	1	1	2
Canary Islands.....	.....	.....	.....	.....	1	0	0
Java.....	.....	.....	.....	.....	1	0	0
Channel Islands.....	.....	.....	.....	.....	1	0	0
China.....	.....	.....	.....	.....	.....	1	0
West Indies.....	.....	.....	.....	.....	.....	1	0
Isle of Man.....	.....	.....	.....	.....	.....	1	0
Norfolk Islands (South Pacific).....	.....	.....	.....	.....	.....	1	1
Alaska .....	.....	.....	.....	.....	.....	1	1
Bermuda .....	.....	.....	.....	.....	.....	1	2
Zululand .....	.....	.....	.....	.....	.....	0	1

* These fourteen patents were granted during the year to assignees of subjects of the Emperor of Germany; the assignment to citizens of countries not at war with Great Britain having been made previous to the outbreak of hostilities.

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The total number of patents granted to Canadian inventors was 1,281, and were distributed among the provinces of the Dominion as follows:—

Ontario.	Quebec.	British Columbia.	Manitoba.	Alberta.	Saskatchewan.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Yukon.
540	237	92	89	65	60	21	17	3	1

Patents issued to residents of Canada, with the ratio of population to each patent granted:—

Provinces.	Patents.	One to Every.
British Columbia... ..	92	3,943
Ontario... ..	540	4,666
Manitoba... ..	89	5,109
Alberta... ..	60	6,215
Saskatchewan... ..	65	7,577
Yukon... ..	1	8,000
Quebec... ..	237	8,441
New Brunswick... ..	17	20,695
Nova Scotia... ..	21	21,992
Prince Edward Island... ..	3	31,240

Statement of the number of patents issued under the Act, on which the fees are paid for periods of six, twelve, or eighteen years, at the option of the patentee; and of patents on which the certificates of payments of fees were attached after the issue of patents originally granted for periods of six and twelve years:—

Period for which fees were paid on first issue.			Patents on which Certificates were attached after issue.		Reissues.		
6 years.	12 years.	18 years.	6 years.	12 years.	6 years.	12 years.	18 years.
6,787	3	9	1,381	38	8	1	4

COMPARATIVE STATEMENT of the transactions of the Patent Office from 1907 to 1916, inclusive.

Year.	Applica- tions for Patents.	Patents and Certificates Granted.			Caveats.	Assign- ments of Patents.	Fees received.
		Patents.	Certifi- cates.	Total.			
							\$ cts.
1907.....	7,077	6,121	634	6,755	285	3,003	169,548 78
1908.....	7,406	6,774	744	7,518	317	2,900	178,482 49
1909.....	7,239	6,395	827	7,222	319	3,001	176,692 05
1910.....	7,789	7,223	1,010	8,233	448	3,147	194,571 54
1911.....	8,037	7,249	1,002	8,251	406	3,256	200,164 41
1912.....	8,293	7,399	1,113	8,512	348	3,725	207,762 77
1913.....	8,681	7,502	1,199	8,701	353	3,741	218,125 02
1914.....	8,359	7,918	1,323	9,241	354	3,432	215,001 71
1915.....	7,302	6,867	1,211	8,078	391	3,391	150,028 37
1916.....	7,793	6,812	1,419	8,231	419	3,311	202,630 40

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The total number of reports issued by the examiners during the year was 11,641 and 13 patents were surrendered and reissued.

Out of the total number of patents granted by this office during the year there were 4,972 issued to inventors or assignees resident in the United States, being 73 per cent of the whole issue. •

This branch of my department continues to receive the official reports of patents from Great Britain, Australia, New Zealand, United States, Mexico, Portugal, Italy, Belgium, France, and Japan, in addition to other periodicals of a scientific nature, in exchange for the Canadian Patent Office Record.

There were 2,053 patents brought under the conditions of the compulsory license clause, section 44 of the Patent Act.

The number of notices under section 8 of the Patent Act was 1,026.

On the 28th of November, 1914, two licenses were granted under the Orders and Regulations, respecting Patents of Invention, made under "The War Measures Act, 1914," as follows:—

Number of Patent.	Name of Registered Owner.	Short Title.	Name and Address of Licensees	Date of Grant.
133636	Farbwerke Vorm. Meister Lucius & Bruning assignee of Paul Ehrlich and Alfred Bertheim.	The Manufacture of New Derivatives of the Para-Oxyarylar-sinic acids,	Ernest Neil Macallum and Charles Newton Candee, Jr., trading under the name and style of the Synthetic Drug Company, Toronto, Ont. Gustave Archambault, M. D., Montreal, Que.	Nov 28, 1914
152320	Farbwerke Vorm. Meister Lucius & Bruning assignee of Paul Ehrlich and Alfred Bertheim.	The Manufacture of New Derivatives of the Para-Oxyarylar-sinic acids.	Ernest Neil Macallum and Charles Newton Candee, Jr., trading under the name and style of the Synthetic Drug Company, Toronto, Ont. Gustave Archambault, M. D., Montreal, Que.	
141573	Farbwerke Vorm. Meister Lucius & Bruning assignee of George Korndörfer.	The Manufacture of Derivatives of Dioxydiamino-arseno-benzene.	Ernest Neil Macallum and Charles Newton Candee, Jr., trading under the name and style of the Synthetic Drug Company, Toronto, Ont. Gustave Archambault, M. D., Montreal, Que.	
144874	Farbwerke Vorm. Meister Lucius & Bruning assignee of George Korndörfer and Baptist Reuter.	The Manufacture of Derivatives of Diamidodioxy-arseno-benzene.	Ernest Neil Macallum and Charles Newton Candee, Jr., trading under the name and style of the Synthetic Drug Company, Toronto, Ont. Gustave Archambault, M. D., Montreal, Que.	

IV. COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

STATEMENT of Fees received by The Copyright and Trade Mark Branch from April 1, 1915, to March 31, 1916.

Month.	Trade Marks.	Copy- rights.	Designs.	Timber Marks.	Assign- ments.	Copies.	Totals.
1915.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
April.....	2,740 60	126 49	104 50	.....	55 00	36 15	3,062 74
May.....	2,820 40	143 66	95 00	4 00	32 20	39 25	3,134 51
June.....	2,380 70	138 15	65 00	25 00	69 20	8 25	2,686 30
July.....	2,013 90	126 50	46 00	.....	42 00	4 25	2,232 65
August	3,039 15	113 50	71 00	6 00	32 00	11 50	3,273 15
September.....	2,831 00	203 65	120 00	.....	69 00	14 75	3,238 40
October.....	2,169 00	135 97	115 00	.....	38 00	47 00	2,504 97
November.....	2,659 42	122 50	90 00	10 00	15 00	11 75	2,908 67
December.....	2,856 55	185 05	160 00	15 50	17 00	23 75	3,257 85
1916.							
January.....	2,619 92	140 00	75 00	4 00	40 00	17 50	2,896 42
February	2,524 80	104 00	100 00	12 00	60 00	16 00	2,816 80
March.....	3,330 50	114 50	134 00	2 00	24 00	35 75	3,640 75
Refunds	31,985 94	1,653 97	1,175 50	78 50	493 40	265 90	35,653 21
	5,850 60	24 50	114 00	2 00	12 00	5 00	6,008 10
	26,135 34	1,629 47	1,061 50	76 50	481 40	260 90	29,645 11

The particulars of the registrations made by The Copyright and Trade Mark Branch of the Department of Agriculture during the year ended March 31, 1916, are as follows:—

I. COPYRIGHTS—	
Full Copyrights without Certificates.. . . .	1,137
Full Copyrights with Certificates.. . . .	143
Temporary Copyrights without Certificates.. . . .	89
Temporary Copyrights with Certificates.. . . .	..
Interim Copyrights without Certificates.. . . .	99
Interim Copyrights with Certificates.. . . .	3
Renewals of Copyrights.. . . .	6
Assignments.. . . .	29
	1,506
II. TRADE MARKS.. . . .	951
Renewals of Specific Trade Marks.. . . .	68
Assignments of Trade Marks.. . . .	231
III. INDUSTRIAL DESIGNS.. . . .	200
Renewals.. . . .	15
Assignments.. . . .	19
IV. TIMBER MARKS.. . . .	27
Assignments..
Total registrations.. . . .	3,017

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The following tables show a comparative statement of the business of this branch from 1904 to 1915, inclusive:—

Year.	Letters Received.	Letters sent.	Copyrights Registered.	Certificates of Copyright.	Trade Marks Registered.	Industrial Designs Registered.	Timber Marks Registered.	Assignments Registered.	Fees Received.
									\$ cts
1904	2,858	3,293	1,106	228	621	107	25	118	30,617 30
1905	3,367	3,902	1,130	189	661	139	22	154	23,706 75
1906	5,340	5,193	1,228	169	1,119	125	47	282	33,107 10
1907	4,475	4,353	1,140	175	848	182	39	136	30,073 20
1908	6,647	4,980	1,416	170	892	162	44	343	37,514 00
1909	6,320	5,750	1,535	171	1,059	143	108	174	38,071 31
1910	6,411	7,688	1,699	206	1,021	118	39	386	42,153 76
1911	7,027	7,091	1,593	213	1,212	149	39	230	43,327 85
1912	9,435	9,322	1,760	205	2,315	128	15	559	51,043 21
1913	8,441	9,220	1,835	207	1,378	165	57	264	49,475 02
1914	8,190	9,292	1,675	193	1,106	224	24	242	39,522 03
1915	6,815	7,446	1,477	146	1,019	215	27	279	35,653 24

V. PUBLIC HEALTH AND QUARANTINE.

I have again the satisfaction of being able to state that no epidemic infectious disease from abroad has been allowed to enter Canada this year.

At my coast quarantine stations on the Atlantic and Pacific oceans 125,055 persons have been inspected.

Eighty persons were admitted into hospital at the various stations. In 1914 there were 543. In 1913, 1,966.

In every instance the disease was stamped out at the station, and so prevented from appearing inland.

The small number of persons inspected and of patients admitted to hospital compared with last year and the year before is doubtless owing to the marked diminution of immigration due to the war.

Asiatic Cholera.—During the past year this disease has been reported in the following countries: Austria-Hungary, Borneo, Ceylon, China, Dutch East Indies, Germany, India, Indo China, Italy, Japan, Java, Philippine Islands, Russia, Serbia, Siam, Turkey in Europe and Turkey in Asia.

The experiences during the year in connection with this disease have confirmed previous observations, and placed the existence of healthy "carriers" beyond doubt.

Bubonic Plague.—This disease has been reported during the year in the following countries: Argentina, Azores, Bahrein (in Persian gulf), Brazil, Ceylon, China, Cuba, Dutch East Indies, Ecuador, Egypt, Greece, Hawaii, India, Indo China, Japan, Libya (Tripoli), Mauritius, Persia, Peru, Russia, Senegal, Siam, Straits Settlements, Turkey, Union of South Africa, United States, and Zanzibar.

In the United States of America cases of human plague were reported at New Orleans on August 27 and September 8 last. Plague-infected rats were found on May 6, August 8 and 25; September 3, 12, 17 and 25; November 6, 23, 24 and 26;

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December 4 and 17; January, 1916, on the 6th, 7th, 8th, 25th and 29th; February 3 and 10; and on the 13th of March. In California, infected ground squirrels were found on July 1; August 6, 9, 12, 14 and 23; November 13; and on the 4th, 7th and 18th of March.

In Seattle a plague-infected rat was found on July 28, and one on November 30.

In Louisiana a plague-infected rat was trapped on the 4th of March, and one on the 10th.

In Hong Kong the last reported case of plague was on the 4th of March.

In Hawaii the last case of human plague was on December 16, 1915, and the last case of rat plague was on January 18, 1916. In Peru during the year 1915 there were 455 cases of plague, with 240 deaths.

At Zanzibar during the month of December, 1915, 4,421 rats were examined. No plague infection was found.

In Liverpool, England, the examination of rats was continued throughout the year. No plague infection was found.

Smallpox.—This disease has again had a practically worldwide appearance during this year.

One case of it has presented itself at the quarantine station at William Head, B.C. It is still under treatment there.

Prior to the date of my last annual report owing to epidemic outbreaks of smallpox in the bordering states of Minnesota and North Dakota, U.S.A., we had been obliged to establish an international medical quarantine frontier inspection at Emo and at Fort Frances, Ont.; at Gretna, Man.; and subsequently at Rainy River, Ont. Owing to the cessation of the epidemic threatening, I was enabled to raise them all on the 15th of June last.

Typhus Fever.—The epidemic of typhus fever which spread over Serbia from December, 1914, to July last was, in proportion to the territory involved and the population affected, the most severe that Europe has ever experienced. Conservatively, it is stated that one out of every five of the two and a half million population was attacked by typhus, and 135,000, including 30,000 Austrian prisoners, died of typhus during this epidemic.

Leprosy.—There are at present in the leper lazaretto at Tracadie, N.B., fifteen leper patients, seven males and eight females; the smallest number for many years. Eleven of these are of French-Canadian (Acadian) origin, one of English, one of Icelandic, one of Russian, and one of Syrian. Two of these patients are now practically well. The two former inmates discharged, apparently cured, in 1912, remain in good health. There were two deaths during the year, and one new patient was admitted. Amelioration of symptoms and sufferings continues to be observed under the treatment now being carried out.

The leper lazaretto at Darcy Island, British Columbia, has not been in use this year; its former inmates having been sent home to China, to their great satisfaction, and no new case has been reported in British Columbia this year.

Beri-beri.—Among investigators into this disease a large majority accept the tenet that beri-beri is the result of subsisting on a diet deficient in certain sub-

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stances termed "vitamins," which are essential for the normal functioning of the nervous system.

There are, however, some authorities who still question the deficiency theory, and who maintain that beri-beri is probably of an infectious nature.

Enteric Fever.—As further evidence of the value of anti-typhoid inoculations, the report of the Research Society issued in January last says that among the Expeditionary Force in France and Belgium about 95 per cent have been protected against enteric fever, the annual average being about 90 per cent. The annual admission ratio per 1,000 is more than nine times greater among the non-protected than among the protected. Among the non-protected it is 9.1 per 1,000. Among the protected only 1 per 1,000. The death ratio is thirty-one times greater.

Trench Fever.—This disease is a comparatively short fever, which has affected thousands of men in the trench zone and the men of the Royal Army Medical Corps who attend to those suffering from it. Being peculiar in many of its features it has received the name trench fever. The disease is a definite entity, and of infective nature.

American Public Health Association.—This association includes the United States of America, the Dominion of Canada, the Republic of Mexico and the Republic of Cuba. The Director-General of Public Health has represented the Dominion at the annual meetings of this association since 1887 and is one of its past presidents. I delegated him to attend the annual meeting at Rochester, N.Y., September 6 to 10. At this meeting he was elected an honorary member of the association. Other sanitarians similarly honoured at the same time were Dr. Stephen Smith, the first president, 1872-3 and 4; Surgeon-General Gorgas, of Panama Canal Zone fame; Surgeon-General Strenburg, the bacteriologist; and Dr. Henry Holton, of Vermont.

Circulars.—Circular letters were issued from time to time to the different officers, drawing their attention to the various matters during the year connected with the appearances and movements of epidemic diseases abroad.

Public Works Health Act.—The inspectors report that the year has been an exceptional one in its freedom from infectious disease amongst the men employed in the various public works coming under their observation.

Changes in Medical Staff.—Drs. V. N. Mackay, and Wm. Warwick, Medical Assistants and Bacteriologists at Halifax, N.S., and St. John, N.B., were given temporary leave to join the Canadian Army Medical Service for overseas service. Their places were filled for the time by the employment of Dr. A. E. Blackett, at Halifax, and by the transfer to St. John of Dr. Heagerty from the St. Lawrence service for the winter.

Military Occupation.—To meet the demands for preparation for defence, I allowed the occupation by the military of all the buildings I could possibly spare at the quarantine stations of Lawlor's island, Halifax, N.S., and Partridge island, St. John, N.B., without entirely crippling them for their essential quarantine service. These islands occupy advanced positions in their respective harbours, and their military occupation was at the request of the Department of Militia and Defence.

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Aftermath.—Lord Derby has recently voiced the feeling generally held that there will undoubtedly be a large emigration from Europe to the overseas dominions after the war. Tired of war conditions, the people of Britain and other European countries will doubtless seek peace in the newer lands. Of all the dominions, can any present such attractions as Canada, with its boundless prairies, and its 300,000,000 acres of untouched farm land in the west?

To meet this impending immigration, and the disease that is only too probably to be expected with it, the Public Health Service will be ready and alert to make the best possible use of the appliances in its hands for the protection of this Dominion.

The whole respectfully submitted.

MARTIN BURRELL,
Minister of Agriculture.

PUBLIC HEALTH.

APPENDIX No. 1.

REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH.

(F. MONTIZAMBERT, I.S.O., M.D. Edin., F.R.C.S.E., D.C.L.)

March 31, 1916.

SIR,—I have the honour to submit this my report as Director-General of Public Health for the year ending this day.

In some of your quarantine ports the number of inspections has been considerably greater than in former years. This is, in part at least, due to the withdrawal for war purposes of large vessels and their replacement by more numerous smaller ones.

The number of persons inspected, and of persons admitted to your quarantine hospitals shows a marked decrease owing to the enormous falling-off in immigration and passenger travel generally on account of the war.

Newspaper and public comment endorse Lord Derby's recent statement that there will undoubtedly be a large emigration to the overseas dominions after the war. Tired of war conditions, the people of Britain and other European countries will doubtless seek peace in the newer lands, and of all the dominions can any present such attractions as Canada, with its 300,000,000 acres of untouched farm land in the West?

To meet this impending immigration, and the sickness that is only too probably to be expected with it, your quarantine stations should be more fully prepared than they are at present. The most pressing needs are:—

At Grosse Isle, Que., the completion of the sorely-needed hospital, on the foundations already built; and a "T" across the end of the western wharf so as to allow infected vessels to be brought to it.

At Partridge island, St. John, N.B., a deep-water wharf.

At William Head, Victoria, B.C., a water supply for fire and general purposes.

At Prince Rupert, B.C., a water supply, and a disinfection building.

Asiatic Cholera.—Since my last annual report this disease has been reported in the following countries: Austria-Hungary, Borneo, Ceylon, China, Dutch East Indies, Germany, India, Indo-China, Italy, Japan, Java, Philippine Islands, Russia, Serbia, Siam, Turkey in Europe and Turkey in Asia.

The statistics and experiences derived from the cholera outbreak in Manila somewhat more than a year ago furnish a number of new considerations for the guidance of those entrusted with the problems of public health. Two important features stand out clearly in the light of the successful control of the situation in the Philippines. One of these is the demonstration that in effectively combating a cholera invasion, the use of laboratory facilities in the making of bacteriologic diagnosis on a large scale is absolutely essential. Without such assistance as is

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available in the well-equipped Insular Bureau of Science, the results which have been accomplished would have been impossible. From November 1 to November 10 alone approximately 20,000 bacteriologic examinations were made, and before the work of inspection was completed, the number of examinations must have exceeded 100,000. The administration of such a service is, by itself, an affair of no small magnitude; and the task assumes an even more formidable aspect when one recalls that social and political difficulties often need to be overcome in order to make possible an inspection of persons who usually present no outward manifestations of ill health. Carriers must be detected regardless of the consequences. To avoid a danger one must know where it lurks.

Lieut.-Col. Munson, who was the adviser of the Bureau of Health, but who has now returned to this country, has remarked that the work at Manila meant invasion of the accepted rights of the home and of the individual on a scale perhaps unprecedented for any community. The collection of the fecal specimens might fairly be regarded as repulsive to modesty. Add to this, he continues, the facts that the search was made among persons, to themselves and others apparently healthy, who could scarcely fall even within the class of suspects, and that those found to be carriers were subjected to all the inconveniences of isolation, separation from family, loss of earning capacity, etc., and it is apparent with what tact and caution the work had to be carried out and public opinion created in favour of it as an unpleasant but necessary measure.

The second lesson of the Manila outbreak of 1914 was the importance of the cholera carrier. In periods when the mortality is high, the proportion of persons who are carriers without presenting symptoms of the disease will be relatively small; but when the mortality is light, according to Munson the lack of virulence in the germ will probably permit it to be harboured in many cases without the production of symptoms, so that a considerable percentage of carriers may be expected. Outbreaks such as that of 1914 in Manila, accordingly, occur in which the carriers appear to have been not only the most numerous but also the most insidious and dangerous sources of infection. It was undoubtedly spread chiefly by personal contact. Public water supplies and articles of food—all of which were formerly charged with a major offense in the transmission of such diseases—were eliminated as channels of infection, and likewise the flies played an insignificant part at most in its spread. According to the experts in the field, the lack of use of toilet paper, certain habits in the use of the toilet, infected fingers, and the habit of eating food with the hands from a common dish furnish opportunities for passing the infection from the carrier to another person.

A further lesson emphasized by the recent experiences is that the five-day period usually accepted for incubation and quarantine will not suffice in a very considerable number of instances. This, as Munson points out, sheds light on cholera situations not otherwise readily explained. An observed convict who died of true cholera after an eighteen-day period as a carrier "might have travelled half way around the world scattering his infection broadcast" and died of the disease in a place thousands of miles from any other source of infection. There is a warning in such cases, says Munson, that health officers all over the world would do well to heed.

An examination of many cholera patients and carriers by Schobl showed that vitality of cholera vibrios in the human body is not inconsiderable. In forty-three out of eighty patients, the stools were positive for from two to seven days; in twenty-two, from one to two weeks; in six, from two to three weeks; in one case, for forty-eight days. Treatment to free the intestine of the invading micro-organism seems to have been of little value. Trained experts are necessary to manage the serious situations that may be created. Munson's advice deserves to be emphas-

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ized; the prompt eradication of a general cholera infection includes the detection and isolation of carriers as a scientific prerequisite.

The British Medical Journal, May 22, last, says: The existence of healthy "carriers" is beyond doubt. The length of time during which the vibrio can be recovered from the stools of convalescents is variable. V. Stuhlern (1909) gave ninety days, Jakowleff fifty-seven days, Burgers sixty-nine days. Montefusco (1910) obtained positive results in 46 per cent from ten to fifteen days, in 21 per cent from fifteen to twenty, in 10 per cent from twenty to twenty-five, in 10 per cent from one to ten days, while the remainder fell between thirty-five and seventy-eight days. The percentages of healthy contacts excreting vibrios vary. Taking the case of arrivals from districts not known to be infected, of 5,200 healthy persons examined in Prussia on the Russian frontier in 1910, three were "carriers"; in Holland during the same year, of 7,338 arrivals from suspected Baltic ports seven were "carriers." In Naples, of 2,000 intending emigrants twelve were "carriers." The proportions are much higher in epidemic times, so many as six per cent being found at Petrograd during the epidemic of 1910, while much higher percentages have been recorded in Austria and Roumania but based upon small absolute numbers. The duration of the healthy "carriers" condition does not usually exceed three weeks; thus of 577 "carriers" at Petrograd, only twenty-four still persisted after three weeks, but rare instances are known of more than six months' duration (Gaffky, Janssen, Sparmberg).

The epidemiological importance of "carriers" is at present indeterminate, and, as we have remarked, the presence of the micro-organism is only one, although an essential, factor of the disease.

It is not far from the truth to say that until recently the treatment of cholera has been essentially expectant and symptomatic. Specific antiseptic substances administered by mouth to inhibit the growth of the infecting organisms in the alimentary tract have been without value. Attempts have been made sometimes to expel the bacterial invaders by the use of purgative drugs. Yet such procedures fail to bring any relief whatever to some of the consequences and complications that attend the original intoxication. Prominent among the latter are the renal lesions, not infrequently accompanied by uremia.

Dr. A. W. Sellards of the Johns Hopkins Hospital, who has had an extensive experience in the treatment of cholera in the Far East, has lately pointed out that some of the symptoms of uremia which resemble toxemia are due, not to the presence of a foreign toxin, but to the depletion of a normal constituent of the blood. In cholera, according to Sellards, there is a greatly increased tolerance to alkali bicarbonate. This tolerance, however, is not specific for the nephritis of cholera. It occurs not only in nephritis arising from other infections, but also in the nephritides which are free from infection. In this respect, therefore, there is a close relationship between the renal lesions of Asiatic cholera and the ordinary forms of acute and chronic nephritis. In renal disease (chronic interstitial nephritis and primary contracted kidney) a group of clinical symptoms, including dyspnea, changes in the alkali content of the blood, and decrease in its quota of carbon dioxide, reach their height during the stage of uremia. Similarly uremia, which follows the common renal disturbances of cholera, is plainly something more than a mere intoxication. The death rate from the uremia alone has been higher than in the majority of the common specific bacterial infections.

It is at this stage of reaction in cholera, when the evidence of nephritis is becoming prominent, that a distinct increase in the tolerance to sodium bicarbonate develops. Sellards has described it as a clinical picture of acidosis. It seems best, however, to avoid the use of this ill-defined term, which means intoxication with

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acid in its original sense. As Fischer remarks: The word "acidosis" has had its meaning twisted so greatly to suit the whims of different authors that it might well disappear from our medical and physiologic writings. The mere finding of various acids or "acidosis compounds" in the urine or elsewhere does not yet mean an acid intoxication. The acetone bodies of the diabetic do not betray an acid intoxication, but an altered chemistry from which an acid intoxication may result. A normal or abnormal acid may be produced in great quantities in the organism and appear in the urine, yet if sufficient base is available they are neutralized and so are practically without effect. What Sellards actually implies to be the nature of the "acidosis" associated with the nephritis and uremia of cholera is an impoverishment of the sources of fixed bases in the body.

This deficiency in carbonates, with its train of symptoms ending in coma and air hunger, is conceivably attendant upon a diminished excretion of acid on account of urinary changes due perhaps to impaired functional capacity of the kidney; or it may be attributable to loss of alkali directly by the bowel during the excessive purging that occurs. In any event, Sellards believes that the clinical evidences are sufficiently definite to constitute a rational basis for treatment of the uremia of cholera with alkalies in the form of bicarbonate. He maintains that in practice it has proved far more efficient than the use of solutions of sodium chloride, which have been employed with some success in the stage of collapse to restore the fluid lost from the body.

Alkali therapy in cholera is not entirely new. The attempt of Sellards is in the direction of a more rational application of the principles discussed above. It is regarded as advisable to give a mildly alkaline solution (0.5 per cent of sodium bicarbonate) early in the course of the disease, before an outspoken uremia has developed, and to increase the quantities if symptoms of uremia appear. As much as 100 grams (3½ ounces) of bicarbonate may be required in the course of two or three days. Experience in two epidemics of cholera speaks favourably for this mode of treatment.—*Journal A.M.A.*

Bubonic Plague.—This disease has been reported during the year in the following countries: Argentina, Azores, Bahrein (in Persian gulf), Brazil, Ceylon, China, Cuba, Dutch East Indies, Ecuador, Egypt, Greece, Hawaii, India, Indo-China, Japan, Lybia (Tripoli), Mauritius, Persia, Peru, Russia, Senegal, Siam, Straits Settlements, Turkey, Union of South Africa, United States and Zanzibar.

In the United States of America the work of plague eradication has been steadily carried on by the United States Public Health Service. Cases of human plague were reported at New Orleans on August 27, and September 8 last. Plague-infected rats were found in that city in May, August, September, November, and December, 1915, and in January, February, and March of this year. The last one reported was on the 16th of March.

The plague status of New Orleans is given by the United States Public Health Service to March 18, 1916, as follows:—

Last case of human plague, September 8, 1915.

Last case of rodent plague, March 16, 1916.

Total number of rodents captured to March 18, 648,544.

Total number of rodents examined to March 18, 336,776.

Total cases of rodent plague to March 18, by species:—

Mus musculus..	6
Mus rattus..	18
Mus alexandrinus..	12
Mus norvegicus..	246
Total rodent cases to March 18, 1916..	282

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The Journal of the American Medical Association thus summed up the plague situation in New Orleans on October 2, last:—

After a lapse of nearly a year a case of human plague occurred in the city of New Orleans, August 27. This case was confirmed as true bubonic plague on September 8. The epidemiologic investigations as to the exact source of the infection have not yet been completed but it is believed that it was probably received in the city of New Orleans. The occurrence of this case demonstrates the difficulties surrounding the eradication of the disease and indicate that had it not been for the active co-operative efforts of the United States Public Health Service and of the departments of health of the state of Louisiana and the city of New Orleans, the outbreak would have reached greater proportions and would have been longer continued. It also points out to other cities the necessity for ridding themselves of the rodent carriers of the disease and of thoroughly rat proofing all of their buildings. No fear is felt that this case will be followed by an outbreak. Officers and men of the Public Health Service, well trained in the control of the disease, are on the ground and with the health authorities of the city of New Orleans are taking every precaution to prevent the spread of the disease from the city and within it. During the three months from July 17 to September 18, the United States Public Health Service, in its work against bubonic plague in New Orleans, fumigated 118 vessels with sulphur, 144 with carbon monoxide and 15 with hydrocyanic acid gas; and issued 345 clean bills of health and 54 foul bills of health. In the department of field operations 56,233 rats were trapped, 101,226 premises were inspected and 7,281 buildings were rat proofed. The department of laboratory operations received 7,281 specimens of *mus rattus*; 13,988 of *mus Norvegicus*; 1,090 of *mus Alexandrinus*; 38,915 of *mus musculus*; 466 wood rats, 308 musk rats and 842 putrid rats. In all, 56,160 rats were received at the laboratory. Of these, 18,605 were examined, 169 were found suspicious and in 7 rats the diagnosis of plague was confirmed. The confirmed rodent cases were as follows: No. 245, captured at 617 St. Marys street, July 7, diagnosis confirmed July 14, premises treated by intensive trapping, premises vacated and demolished and rat proofing initiated; No. 246, captured at Galves and Erato streets, July 13, diagnosis confirmed July 20, and premises treated with intensive trapping in the neighbourhood and on the Galves dump and pushing forward of the rat-proofing operations; No. 247, captured at 536 S. Roman street, August 1, diagnosis confirmed August 8, premises treated by intensive trapping, destruction of rat harbours, spraying of the premises with pulecide and the completion of rat proofing; No. 248, captured at 2503 Howard street, August 17, diagnosis confirmed August 25, and the premises treated by intensive trapping, destruction of rat harbours, premises sprayed with pulecide and rat proofing expedited; No. 249, captured at Harmony Street Wharf, August 19, diagnosis confirmed September 2, and premises treated by intensive trapping; No. 250, captured at 1423 Joseph street, September 6, diagnosis confirmed September 12, premises treated by summary destruction of rat harbours, spraying of pulecide in the vicinity, intensive trapping and rat proofing, and No. 251, captured at 837 S. Fulton street, September 9, diagnosis confirmed September 14, premises treated by intensive trapping, fumigation by cyanid gas and rat proofing. During the week ended July 24, one suspicious human case was suspected and another during the week ended August 28, and one human plague case was discovered as reported above. Since the initiation of the work against plague in New Orleans, 44,938 buildings have been rat proofed, and 442,497 rodents have been captured, of which 286,087 were examined. Rodent plague was found in 4 cases in *mus musculus*, in 17 cases in *mus rattus*, in 8 cases in *mus Alexandrinus*, and in 222 cases in *mus Norvegicus*.

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In the Ohio Public Health Journal Assistant Surgeon General W. C. Rucker writes as follows: It is not at all unlikely that a thorough search would demonstrate the presence of plague in other American seaports having a large foreign commerce.

The experience at New Orleans is an ample demonstration of this assertion. Several thousand rats were examined before a single one was found which was plague-infected, and this one would in all probability have been entirely overlooked had it not been for the large experience of the examiners. The examination of rats is a matter requiring considerable skill and much experience, and whenever there is a plague outbreak as many sanitary officers as possible should visit the scene and thoroughly familiarize themselves with the methods to be used in diagnosing, studying, and combating the disease. This was done at New Orleans, and representations from many of the States found there an excellent opportunity to acquire knowledge of the disease at first hand.

Granted the existence of such a condition, what are the steps to be taken to combat it? The first line of defence is maritime quarantine. This may be so applied as to be exceedingly effective, but such efficiency is to be obtained only at the price of disastrous interference with commerce. The routine disinfection of ships, if done very thoroughly, will prevent the introduction of rats, and therefore the introduction of bubonic plague, but such a measure is of temporary value only, and if omitted a single time may be followed by the introduction of plague rats. In the case of vessels sailing from known plague ports, such fumigation should not be omitted, and in the protection of ports which have not been rat proofed it is also necessary. To sum up, quarantine is absolutely effective only at the cost of commerce. It is at best a makeshift. Disinfection is expensive and not always certain.

The second line of defence is at the wharves and consists in the prevention of the embarkation or disembarkation of rodents. This is accomplished by the use of metal rat guards on all mooring lines; by breasting the vessel off from the wharf by rafts or spars; by the guarding of gang planks; and by the inspection of the freight to determine its rat-proof, rat-free condition prior to loading or unloading. The last is a valuable measure, but not one upon which absolute reliance can be placed.

The third line of defence may consist in the immunization of human beings against bubonic plague. This is at best a weak reed upon which to lean. In the absence of an epidemic it is manifestly impossible in American cities to enforce Haffkinization. Under the most favourable conditions only a small portion of the community would consent to voluntary immunization, and of those who took the treatment only a small proportion would be among the stevedore and water-front class, the very people who are most liable to the disease at the beginning of the epidemic.

The fourth line of defence consists in rat proofing the environment in which man works and lives. All of the other lines of defence or any combination of them may be used, but the single one upon which absolute reliance can be placed and from which lasting protection may be obtained is by the insulation of man from the animal which serves as the disseminating host of bubonic plague. Any city which will render itself completely rat proof need have no fear whatsoever of plague. The introduction of plague rats into such a place will be an occurrence of no account, because if rats and therefore the insects which they harbour are excluded from close contact with man it is a matter of entire indifference to him whether the rats have plague or not. It is not infrequently urged that rat proofing is expensive. In the final analysis this is not true, and by reason of the more rapid and increased commercial communication which we have with all the rest of the world, rat proofing has become as absolutely necessary as are good roads, sewers, and public water supplies.

No modern city can afford to regard rat proofing as a luxury. It is the duty of every municipality to incorporate in its public health and building codes ordinances

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requiring the rat proofing of all structures within the limits of its jurisdiction. If the passage of such legislation is put off until an epidemic has appeared the work must be done under pressure. It is then relatively expensive. If the work is done gradually, particularly if it is done at the time the building is erected, the cost is comparatively trifling.

The only kind of rat proofing which is really worth while is by the use of permanent impervious material, such as brick, concrete, or stone. This will fortify the ground areas against the entrance of the Norway rat. In the installation of such rat proofing great care is necessary that all accidental openings, such as are found around plumbing, electric wiring, and the like, be closed effectively. All openings above the ground area should be closed with metal screening so that the climbing rats may not enter in this way. Those who live or work in rat-proof premises need have no fear of plague, and the city which is rat proof will not become the scene of an epidemic of the disease.

The eradication of plague from the city of New Orleans has already cost the nation, the state, and the municipality upward of \$400,000, exclusive of the large sums of money which corporations and private individuals have laid out in rat proofing. The \$400,000 expended for epidemic measures would have gone a long way toward building permanent fortifications against rats. In addition, it should be pointed out that the business losses which the presence of an epidemic produces are so great as to be almost beyond computation.

In California infected ground squirrels were found in July, August, November, and on the 4th, 7th, and 18th of this month.

The following record of plague infection in California is given by the United States Public Health Service:—

Places in California.	Date of last case of human plague.	Date of last case of rat plague.	Date of last case of squirrel plague.	Total number rodents found infected since May, 1907.
Cities:				
San Francisco	Jan. 30, 1908	Oct. 23, 1908	(1)	288 rats.
Oakland	Aug. 9, 1911	Dec. 1, 1908	(1)	126 rats.
Berkeley	" 28, 1907	(1)	(1)	(1)
Los Angeles	" 11, 1908	(1)	Aug. 31, 1908	1 squirrel.
Counties:				
Alameda (exclusive of Oakland and Berkeley)	Sept. 24, 1909	Oct. 17, 1908	July 12, 1915	287 squirrels; 1 wood rat.
Contra Costa	July 13, 1915	(1)	Nov. 12, 1915	1,307 squirrels.
Fresno	(1)	(1)	Oct. 25, 1911	1 squirrel.
Merced	(1)	(1)	July 12, 1911	3 squirrels.
Monterey	(1)	(1)	Feb. 23, 1910	11 squirrels.
San Benito	June 4, 1913	(1)	Aug. 14, 1910	90 squirrels.
San Joaquin	Sept. 18, 1911	(1)	" 26, 1911	18 squirrels.
San Luis Obispo	(1)	(1)	Jan. 26, 1910	1 squirrel.
Santa Clara	Aug. 31, 1910	(1)	July 23, 1910	25 squirrels.
Santa Cruz	(1)	(1)	May 17, 1910	3 squirrels.
Stanislaus	(1)	(1)	June 2, 1911	12 squirrels.

1 None. 2 Wood rat.

The work is being carried on in the following named counties: Alameda, Contra Costa, San Francisco, Stanislaus, San Benito, Monterey, Lassen and Modoc.

In Seattle, Wash., plague infected rats were found on July 28, and on November 30.

In Hong Kong the last reported case of human plague was on the 4th of this month.

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In Shanghai during the week ended February 12, 1916, out of 229 rats examined, one was found plague-infected.

In Liverpool, during the two weeks ended February 26, 1916, 492 rats were examined. No plague-infection was found.

In Peru, during the year 1915, 455 cases of plague with 240 deaths were reported.

In Hawaii the last case of human plague was on December 16, 1915, and the last case of rat plague on January 18, 1916.

Union of South Africa, Orange Free State: During the period from January 23 to February 7, 1916, 11 fatal cases of plague, 10 of which occurred in natives and one in a European, were notified in the Orange Free State. The foci of infection were three farms situated in the Hoopstad and Winsburg districts.

At Zanzibar during the month of December, 1915, 4,421 rats were examined. No plague infection was found.

Smallpox.—This disease has had its world-wide prevalence again this year. There is now a vessel, the ss. *Titan* from Yokohama in quarantine at your William Head station for smallpox amongst her 74 passengers. On account of its prevalence in North Dakota and Minnesota frontier medical inspection had to be carried out at Gretna, Man., and at Emo, Fort Francis, and Rainy River, Ont., until June 15, last.

The Journal of the American Medical Association writes:—

Although it considers antivaccination legislation a remote possibility at the present session of the Pennsylvania legislature, the Philadelphia *Record* advises caution, since "the antivaccinationists are as industrious as beavers and as persistent as terriers"; as their measures are cropping up continually, "unless public attention is kept on their campaign they will here and there succeed in their efforts to popularize smallpox." This disease in the eighteenth century is spoken of as "the most appalling foe to the human race," but in recent times has been so thoroughly suppressed that in some communities havoc resulted because it was not recognized by physicians, who had never seen a case. The specious argument of the antivaccinationists that, because smallpox is rare there is no occasion for vaccination, is answered by saying, "Let vaccination be abandoned for a few years, and there will be enough smallpox to make the people, lay and medical familiar with it." Indeed the people of a great many communities are becoming familiar with it to their serious cost, for the disease, because of neglect of vaccination, seems to become more widespread each year. The right of the people to protect themselves from the disease is thus put by the *Record*: "Persons who insist on their right to have smallpox if they wish it, or choose to take their chances, assume precisely the attitude of the man who insists on his right to build a frame house in the middle of a city. If he is willing to take the chance of a fire, he says, whose business is it? Well, it is very plainly the business of the neighbours whose houses would be endangered by the presence of a combustible structure. The unvaccinated child is a menace to a school because he may at any time develop the disease, and if so, he has probably communicated it to a dozen other children of parents who insist on their constitutional rights to take and disseminate smallpox. No man has the right needlessly to make himself or his child a possible conveyor of an appalling pestilence."

One of the stock arguments of the antivaccinationists is that cowpox vaccine may become contaminated with the germs of infectious disease and so transmit the latter to the innocent victim of the assault by the vaccinator. It cannot be denied that tetanus has sometimes attacked recently vaccinated persons, and so there is some plausibility in the contention of the anti's that the tetanus spores were implanted with the vaccine virus. The repeated charges that

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Public Works Health Act.—The inspectors report that the year has been exceptionally free from infectious disease amongst the workmen employed in the various works connected with railway construction, canals, and tunnels. They report the medical service as satisfactory, and the sleeping quarters and boarding of the men employed fully equal to the good conditions of previous years.

Changes in the Medical Staff.—At Halifax, N.S., Dr. J. V. Graham has replaced Dr. Blackett as substitute for Dr. V. N. Mackay, overseas. At St. John, N.B., Dr. Heagerty again took winter duty for Dr. Warwick, overseas. At William Head, B.C., the position of assistant medical officer and bacteriologist is at present vacant. At Prince Rupert, B.C., Dr. John Cade is acting as a substitute for Dr. Tremayne, overseas.

The whole respectfully submitted.

MARTIN BURRELL,
Minister of Agriculture.



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such has been the case have led Dr. John R. Anderson, director of the hygienic laboratory, United States Public Health Service, to undertake a careful investigation of all cases of tetanus following vaccination reported in the past ten years and he has endeavoured to collect accurate data concerning such accidents. The results of this investigation and of a series of animal experiments seem to warrant certain conclusions, of which the following is a summary (Public Health Reports, July 16): (1) It is difficult, if not impossible, to produce tetanus in susceptible animals by vaccination with virus containing large numbers of tetanus organisms which have been purposely placed therein. (2) In view of the failure to demonstrate tetanus organisms in the large amount of vaccine virus specifically examined for this purpose, it seems exceedingly improbable that vaccine virus as sold in the United States contains tetanus organisms. (3) From 1904 to 1913, inclusive, over 31,000,000 doses of vaccine virus were used in the United States. Yet information was obtained of only forty-one authenticated cases of tetanus occurring subsequent to the operation. From this it is concluded that had the virus used during that time in the United States been at fault many more cases of tetanus should have followed vaccination. (4) In view of the large number of vaccinations, about 585,000, done in the United States Army and Navy, and the absence from them of a single case of tetanus following the operation, the cases of tetanus following vaccination in the country at large were evidently not due to infection contained in the virus. (5) The average period from vaccination to onset of symptoms of tetanus in 83 cases was 20.7 days, while the average mortality of 93 cases was 75.2 per cent, this being slightly higher than the mortality of cases of tetanus due to other causes with an incubation period of ten days or less. The conclusions based upon these studies were that in case of tetanus occurring 15 or 20 days subsequent to vaccination the infection is not received through the vaccine virus, but in all probability is received from outside sources about the tenth day or later after vaccination. The infection with tetanus is a contamination of the vaccination wound, such as may occur in the case of any other surgical or accidental wound not properly cared for.

Typhus Fever.—The *Canadian Medical Journal* of July last, says:—

The vigorous measures taken in Serbia against the epidemics of typhus, relapsing fever, enteric, cholera, and smallpox have met with such success that these diseases are now said to be almost stamped out. The origin of the typhus and relapsing fever infections was traced to Valjevo, where the diseases broke out among the Austrian prisoners. Hospital units were sent at once from England and from America to give assistance. On February 15, the British Army Medical Service sent out a sanitary mission under Colonel Hunter and Lieutenant-Colonel Slammers. They proceeded to Nish and at once began to disinfect the hospitals and destroy lice; wine barrels were fitted up as disinfectors and distributed through the towns and villages; inoculation against cholera was carried out, and, wherever possible, bacteriological laboratories were established and investigation made of the sources of the various epidemics. Among other units sent were the Wounded Allied Relief Hospital, the Scottish Women's Hospital, and that sent by the Serbian Relief Fund. Apart from the wounded, there were 37,000 sick in the army, including 15,000 cases of fever, 8,000 of which were typhus, nearly 8,000 cases of relapsing fever, and 1,500 cases of enteric. In Kragujevatz, a town of 20,000 inhabitants, there were 1,400 cases of typhus, and in three months 3,400 deaths had occurred. At Nish on April 5, there were 4,100 cases of typhus in hospitals; on April 18, only 905.

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Dr. Caldwell, Hospital Administrator American Red Cross Sanitary Commission to Serbia, reports in part as follows in a paper read before the Section on Public Health and Medical Science of the Pan-American Scientific Congress, Washington, D.C., December 28, 1915:—

The epidemic of typhus exanthematicus which spread over Serbia from December, 1914, to the end of July, 1915, was, in proportion to the territory involved and the population affected, the most severe that Europe has ever experienced. The spread of this epidemic from the Danube to the Greek boundary, involving every hospital, prison camp, soldiers' barracks and almost every home, was due entirely to preventable causes, to inexcusable indifference on the part of the Serbian civil and military authorities, and to carelessness which amounted to crime.

It is impossible to tell how many were afflicted with this disease, as there are no reliable statistics available. The military reports do not include the civil population and those who were ill and died of this disease unattended by physicians where no diagnoses were made. Conservatively, one out of every five of the two and a half million population was attacked by typhus, and 135,000, including 30,000 Austrian prisoners, died of typhus during this epidemic. The hospital mortality ranged from 19 to 65 per cent. No part of the country escaped, and every city, town and village in Serbia contributed to the morbidity and to the consequent mortality.

The unreliability of the estimates in this epidemic is further increased by the fact that the Serbian physicians classified typhoid fever as typhus abdominalis, relapsing fever as typhus recurrens, and typhus fever as typhus exanthematicus, and they used the term "typhus" vicariously to indicate any one of these three diseases. Lack of physicians in hospitals and among the civil population caused the diagnosis of typhus to be made in almost any case with increase of temperature, and was given as the cause of death in many cases in which it did not exist.

The word "typhus" covered a multitude of sins in diagnosis, as well as a world of ignorance and carelessness. This does not apply, however, to the better hospitals under Serbian control, or to those managed by the American Red Cross units, or to Red Cross missions sent from other countries.

Typhus is transmitted by the louse. The body louse is completely incriminated, the head louse probably so, and the crab louse not at all. While no human experiments were made in Serbia, still the observations made in those cases of typhus occurring in hospitals and private homes gave no evidence that the disease is transmitted in any other manner than through the bite of the infected louse.

Only where the conditions for hygienic living were provided did the Serbian people escape. All classes and professions were affected. The medical profession in Serbia suffered more from the disease and consequent mortality than any other profession, in proportion to its number. Overworked and exhausted by the endless labour of caring for their sick, these civil heroes lost 160 of their number out of a total of 340 at the beginning of the war. To these self-sacrificing men and women a glory as great as any gained on the battlefield or in fire-shelled trench is due. They spared themselves not, they spared no effort and no labour, but worked until exhausted and the disease attacked them. Among our own American physicians who went to the aid of the stricken people of Serbia, five died, two of them, Drs. Donnelly and MacGruder, were members of the American Red Cross units. The nurses did not escape; they too performed heroic deeds, and in one of our Red Cross units eleven out of fourteen were stricken with typhus; happily none of them died. The physicians and nurses which other countries sent to Serbia suffered as heavily.

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The conditions for the spread of the epidemic in Serbia were ideal. During the Balkan War, typhus had invaded Serbia and had never been completely eradicated. Here and there scattered through the country, especially in the northern districts, were sporadic cases, and from these foci of infection the epidemic had its origin. The people were exhausted from previous wars; they had been invaded by a large army, and the civil population had retreated as the army fell back. Belgrade in normal times has 100,000 people; during the war only 30,000 remained. The smaller cities and villages in central and southern Serbia soon became congested and overcrowded. The lack of bathing facilities in the homes of the better class of Serbians, their entire absence in the homes of the middle and poorer classes, the crowded conditions in which they were forced to live, the cold months of the winter, all favoured the intense spread of the epidemic which had started. Then came their military success. The Austrian army was thrown back through the invaded territory and across the Save river, and 70,000 Austrian prisoners were taken captive. These prisoners, starved, exhausted and vermin infested, were distributed in the little cities and villages of central and southern Serbia, thus further increasing the already overcrowded conditions.

In December, 1914, a sick soldier was sent to his home in Belgrade and was confined to his bed for three days before a physician was called and a diagnosis of his case made. His home was in one of the thickly populated quarters of Belgrade, and many of the members of his family, and his curious but well-meaning neighbours, visited him during the period of his illness. When a physician was called the patient was found to be in the fourth or fifth day of the eruptive period of typhus. No effort was made to isolate or quarantine this patient, and people were permitted to visit the patient as before until he died. Within two weeks in this particular section of the city, dozens of cases of typhus developed, and the epidemic spread through all quarters of the city.

In six months it was estimated that 7,000 cases of typhus occurred in the city of Belgrade alone, the civil hospital caring for 1,850 of them, with a mortality of 10 per cent, which was the lowest hospital mortality of which I know in any hospital in Serbia.

The treatment of typhus fever is unsatisfactory. It is supportive and symptomatic in character. The use of the serum prepared by Nicolle, or the vaccine prepared from the Plotz organism, seems to have a tendency to abort the disease, and seems to have a therapeutic value. Plenty of water should be given to the patient, and a saline infusion should be constantly at hand for use at any period, succeeding the eruptive stage and the climax of the disease. The severe emaciation which attends all these cases should be carefully managed. The diet should be carefully selected and carefully administered, and every precaution to support and stimulate the patients judiciously should be taken. The nervous and mental systems, which are very much disturbed, should be carefully cared for, and this disturbance, often continuing for six months following convalescence, should never be neglected.

The prophylactic measures which were employed in Serbia by the American Red Cross Sanitary Commission, and those which are used in the prison camps in Europe and in the quarantine stations of the countries bordering on Serbia, afford an effective prophylaxis in this disease. The value of the Plotz vaccine in immunizing against typhus infection is problematic. It probably has a value which will be fully demonstrated before typhus is eliminated from the Balkans. It was interesting to note that out of two or three hundred people not immune to typhus, who found it necessary to go to this part of Europe during the epidemic, all of whom were inoculated with the Plotz vaccine, among which number were all of the members of the American Red Cross Sanitary Commission, with but one exception, and the members of the mission which Columbia University sent to Serbia, and many others who were exposed at some time or another to a greater or less degree to the infection, not one case of typhus developed.

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Amongst the methods employed to prevent the spread of this disease to neighbouring countries, Dr. Caldwell praises especially those adopted by Greece:—

The most creditable of all, however, was that of the Greek physicians and quarantine officers and sanitarians. Greece bounds Serbia on the south, and since the beginning of the war the only communication which Serbia had with the rest of western Europe and America was through the port of Saloniki, a city of 200,000 people, with an additional 40,000 refugees of all classes, located in buildings and barracks within and about the city. Saloniki is connected with Serbia by two lines of railroads, and the old Via Romana highway affords another means of communication between Monastir and Saloniki. Hundreds of thousands of people travelled in and out of Serbia through this port, and were exposed constantly to the disease while in Serbia during the lifetime of this epidemic; yet such were the carefully executed measures established by the Greek quarantine officers and sanitarians, that less than 200 cases were reported in Saloniki and in the remaining cities of Greece while the epidemic in Serbia existed. At each point of entrance into Greece, the Greek authorities had instituted quarantine stations equipped with disinfecting plants and isolation wards, and every passenger on every train, and every one crossing the boundary line on foot or by conveyance of any kind, was stopped at these stations, examined by competent quarantine physicians, his clothing and baggage disinfected, and all suspicious cases with increase of temperature, due to any cause, held for an incubation period of fourteen days before being permitted to continue the journey into Greece.

Any traveller from Serbia or Saloniki, or any other city in Greece, was again examined by a physician, who issued him a card on which were blanks for the recording of temperature for the five succeeding days, and under heavy penalty for failure to carry out the instructions, the traveller was ordered to report daily to the local physician for the recording of his temperatures. In the city of Saloniki, where a majority of the cases reported made their appearance, the authorities handled the situation in a correct and scientific manner. Every case in the city with rise of temperature from any cause was reported to the health officer, who held the attending physician to a strict account for the faithful reporting of progress and diagnosis in the case.

In any case of doubtful diagnosis, expert professional advice from the health office was tendered without charge to the patient.

The greatest hotbed of typhus and other infections existing in Europe before the outbreak of the epidemic in Serbia was in Galicia and Poland, along the Russian battlefront. With the overrunning of these two immense provinces by the contending armies, the danger from the spread of the disease to the remaining parts of Europe became greater and more apparent each day. When finally the Russians were driven back beyond the borders of Galicia and Poland, and the current of travel between important points of these two provinces again began to flow, it became necessary for the German and Austrian Governments to make great preparations and take the most effective measures to prevent the ingress of infection. On this front is built what the Germans call a "louserin," which was completed at a cost of 5,000,000 marks (\$1,250,000), and was paid for out of the private fortune of the German Emperor. To this great establishment all persons, of whatever age, nationality or rank in life going from Germany into Poland or Galicia, and from those provinces returning into Germany or Austria, are sent and are detained for five days, during which period they are bathed daily and their clothes disinfected in large autoclaves with each bath. At the end of the five-day period each traveller is given a personal examination, and on being found to be free from disease or vermin,

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is given a certificate which permits him to continue his journey across the frontier. No exception is made in the case of any traveller, no matter what his rank or station in life may be, the Imperial family being just as amenable to the rules of this great establishment as the poorest subject of Poland or Germany.

Civic and military authorities in France are co-operating in an endeavour to prevent the spread of typhus fever from wounded soldiers and refugees who return from the trenches to the vicinity of Paris. All such persons are examined to determine whether they are carriers of lice before they are admitted to the hospital and the standard course of procedure is somewhat as follows: The patient is taken to an examining room near the entrance of the hospital. This room is well lighted and furnished in a sanitary manner. The physician in charge makes a thorough examination of all parts of the body to determine whether lice are present. The clothes are removed and placed in a covered receptacle in which they are taken to the disinfecting room. The patient is given a bath in both hot and cold water. If he is known to carry lice the hair and beard are clipped and the skin surfaces soaked in xylol of benzine. The patient then undergoes a thorough rubbing with black soap and sometimes mercurial ointment is used upon special surfaces. The patient is examined upon a portable linen litter upon which he is later removed to the hospital ward. The disinfecting room is a small close chamber and forty to fifty grams of sulphur per cubic meter are burned in the disinfection. The examining physician takes special care to avoid infection and the whole process is most carefully carried out.—*Revue D'Hygiene*, January 20.

The lessons which this epidemic teaches are particularly valuable to the sanitary world, especially to those localities which are from time to time subject to an epidemic of typhus fever. It demonstrates beyond any question of doubt that the disease can be kept out of a country instituting proper quarantine and sanitary measures, and by the proper observance of personal and community cleanliness and hygiene. It has demonstrated with equal certainty that if it should at any time secure a foothold in any locality, it can be easily limited and eradicated in a short time. With our present knowledge of the measures which control this disease, we can take a very optimistic view of the future, and assert with confidence that the epidemic of typhus which Serbia has so recently experienced is probably the last one which will occur in Europe, unless conditions favouring an epidemic are worse than ever before existing in the history of the continent.

At a meeting of the New York Pathological Society held on Wednesday, April 14. Dr. Harry Plotz, of Mount Sinai Hospital announced the isolation of a gram-positive pleomorphic anaerobic bacillus from the blood of 50 per cent of a series of cases of epidemic and endemic typhus fever (Brill's Disease). The bacilli isolated from both types of the disease are identical in their cultural and serum reactions. The bacilli are found only in small numbers in the blood, but have been isolated during the febrile period and as long as thirty-six hours after the crisis. As the disease progresses the agglutination and the complement fixation reactions become positive using the bacilli or extracts in the tests. Because of the shortness of the disease, these reactions are positive more often during convalescence. When cultures are injected into guinea-pigs or monkeys, they cause a febrile reaction similar to that obtained by the injection of blood from a case of typhus fever. The bacilli in cultures quickly lose their virulence. Whether the injection of cultures will protect animals against the inoculation of virulent blood was not stated. The adoption of preventive inoculation with vaccines made from the cultures depends on such immunity tests to susceptible animals.

While a few points need further study the evidence brought forward by Dr. Plotz and his colleagues at Mount Sinai Hospital, indicates that the bacillus discovered is the cause of typhus fever.

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In the opinion of Dr. Caldwell, as quoted above, typhus is transmitted by the louse. This view is generally adopted by recent writers upon this disease. Whilst fully admitting this, I am not as yet prepared entirely to exclude other sources of transmission, such as the breath and other emanations of the patient. And this for two reasons: In the first place in what has been written of the habits of the body louse it is described as clinging closely to the under-clothes. If this be so it seems difficult to account for the rapid spread of an epidemic of this disease by a migration of the louse from body to body. Then in this report of Dr. Caldwell's he tells us of the coming of a sick soldier to Belgrade, and that within two weeks dozens of cases developed, and that in six months 7,000 cases were estimated to be present. Could that well be explained by the migration of infected lice alone? My second reason is that during the thirty-two years I served as a quarantine officer at the St. Lawrence quarantine, 1866-98, I saw a great many cases of typhus fever. It was frequent amongst the European immigrants coming to this country in the small sailing ships in the earlier of those years. Ten members of our staff contracted the disease. Two died of it, a nurse and a hospital orderly. I was one of the ten who took it, and I certainly was not conscious of the presence of any lice. And the cleanly habits of the other members of the staff who fell ill with the disease render it unlikely that they could be attacked by vermin. I have always considered that we contracted the disease from the breath of the patients.

Leprosy.—There are at present in the lazaretto at Tracadie, N.B., fifteen leper patients, seven males and eight females. This is the smallest number for some years. There were two deaths during the year, and one new patient was admitted. Eleven are of French-Canadian, one of English, one of Icelandic, one of Russian and one of Syrian origin. The Syrian patient was sent to the lazaretto from Regina by the Immigration Department, pending his deportation, as he has not been three years in Canada. Two of the patients, a woman of 61, and a man of 43, reported as much improved last year, are now practically well. The two former inmates discharged, apparently cured, in 1912, remain in good health. Chaulmoogra oil, in the various forms, is still found to be the most satisfactory treatment.

The leper lazaretto at Darcy island, British Columbia, is in good repair. It has not been in use this year.

Dr. Mercier devoted his last course of Fitzpatrick Lectures before the Royal College of Physicians of London to leper houses and mediaeval hospitals. He has published the two lectures in a pamphlet which contains a great deal of information and some interesting discussion.

Leprosy existed in England in Saxon times, and the oldest leper house, still existing as a charity, appears to be St. Oswald's Hospital at Worcester, founded by Bishop Oswald in 992. Dr. Mercier thinks, judging from the number of leper houses founded, that the disease reached its height in the second half of the twelfth century. In the first half of that century there were founded at least 46 hospitals, of which 24 were leper houses; in the following fifty years, at least 120, of which 56 were for lepers; in the thirteenth century, 240 hospitals, of which 75 were leper houses; and in the first half of the fourteenth century, 111, of which 42 were leper houses. In that century leprosy began to decline—a fact which Dr. Mercier associates with the Black Death, which swept the country in 1348-9. With the disappearance of leprosy the endowments of the leper houses either disappeared or were devoted to other charitable purposes. One of the oldest leper houses in England, the fabric of which still exists and is used for charitable purposes, is the Hospital of St. Margaret, Monkton, just outside Taunton on the London road. It is a long, low narrow structure, consisting of seven distinct tenements, each with a staircase communicating with the room above; the walls are of stone, faced, for the most part, with plaster, and have a high-pitched thatched roof.

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The New York Weekly Bulletin 30th October, 1915, says:—

The Sanitary Code requires physicians as well as persons in charge of hospitals to report certain infectious diseases and specifically mentions leprosy.

The attitude of the Department of Health towards leprosy is reflected in the recommendations of a committee of the city's leading dermatologists recently consulted by the Department. The recommendations are as follows:—

“Leprosy being an infectious disease, all cases should be reported to and registered at the Department of Health.

“Every case of leprosy should be investigated by a competent diagnostician with the intention of confirming diagnosis (except when reported by a recognized authority on dermatology, who will secure observance of all precautions). The diagnostician should examine all persons exposed and secure the necessary information required in such cases.

“Re-examination should be made for patients and members of household from time to time for a number of years.

“Bacteriological examinations for the bacillus of leprosy should be made in every case when necessary for diagnosis. Research studies on leprosy should be included in the work.

“Patients with suitable home surroundings and where hygienic precautions are observed may be permitted to remain at their homes.

“All cases of leprosy should be supervised from time to time with regard to the observance of regulations and the possibilities of spreading the disease.

“Cases of leprosy unsuited for home care, either because of the character of the case, improper surroundings, or poverty, should be removed to a hospital and detained as long as circumstances warrant.

“After death or removal of a case of leprosy the premises and all infected articles should be disinfected.”

It is estimated that there are 238 known lepers in the United States. It is an accepted fact among physicians that the danger of transmitting leprosy in this climate is small, though there appears to be some danger in the South. When the leper has no open lesions and no discharge from the nose it is safe for him to be at large.

A leper with open lesions, if careful, and if the home conditions are suitable, may be safely segregated in the home. This will avoid the separation of members of a family and its attending unpleasantness.

While the bacilli are not found in the nasal cavities early in the disease, they can occasionally be detected here first. Cases of leprosy with bacilli in the nose will, of course, be observed most carefully.

Vermin, it is thought, plays no unimportant part in the transmission of leprosy. Bed bugs and body lice should therefore be carefully sought for and exterminated.

The Department of Health maintains a list of cases of leprosy. Of the patients at present known to the Department, all but two are under institutional care, and these two cases are under adequate control.

In order to make this list as complete as possible the Department of Health would like to have all cases of leprosy again reported, giving the desired particulars.

The co-operation of managers and superintendents of hospitals and institutions and physicians is earnestly desired to make our records as accurate and up to date as possible. Cards for reporting will be furnished free of charge on request.

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Fraser and Fletcher, claiming a discrepancy in the interpretation of their article: "*The Bacillus Lepræ: Has It Been Cultivated?*" (*Lancet*, vol. II, 1913), point out that the diphtheroid bacillus found in certain tubes on which pieces of leprous nodules had been planted is still considered as a contamination and cite occurrences of diphtheroids in one or two tubes out of thirty which were probably contaminations resulting from the use of disinfectants. Now, with improved technique, the authors have been unable to secure any cultures whatsoever and still adhere to the opinion that there is no evidence of the *Bacillus lepræ* being cultivated artificially.

Among the general public there still remains a great fear of the contagiousness of leprosy, evidently issuing from the erroneous interpretation of certain passages of the Old Testament, and the natural repulsion toward the disease. There is an evident desire to get them quickly gone to a remote place with a wish that they may not be overhasty in their return. As a matter of fact, leprosy is very reluctantly contagious, and must require very special favouring circumstances in order for it "to take." A very modest degree of cleanliness hinders its transmission. As soon as a country becomes well to do and adopts the daily tidiness incident to modern civilized life, leprosy dies out. Although, therefore, the Biblical view of the highly contagious nature of leprosy undoubtedly aided in stamping out the epidemic of the middle ages, in modern life it works an unnecessary hardship on the afflicted, and should give place to a more reasonable attitude, agreeing with the real facts in the case.

Beriberi.—Major Chamberlain, Medical Corps, United States Army, published last April an interesting article on this disease amongst Philippine Scouts; he says:—

Among investigators in the Orient a large majority, I believe, now accept the tenet that beriberi is the result of subsisting on a diet deficient in certain substances, termed "vitamins," which are essential for the normal functioning of the nervous system. There are, however, some authorities who still question the deficiency theory, and who maintain that beriberi is probably of an infectious nature. In view of this skepticism it seems worth while that the experiences of the United States army with beriberi among its Filipino (native) troops should again be brought to notice at this time. I feel that I may do this, first, because I was in charge of the beriberi work in Manila from 1910 to 1912, when the disease was eradicated from the native troops, and am therefore familiar with the circumstances attending this change; secondly, it may be done now because at the present date (January, 1915) there has elapsed a period of time sufficient to render it extremely improbable that the abatement of beriberi in 1910 was a temporary remission merely coincident with, but not due to, a change in dietary.¹

The War Department of the United States maintains in the Philippines a body of native troops officially designated as the "Philippine Scouts." The commissioned officers are white Americans. The enlisted men are Filipinos belonging to various tribes and gathered from all parts of the archipelago. There are about 5,200 men in the scouts, and the companies are located in numerous garrisons throughout nearly all portions of the Philippine Islands. Organizations are frequently changed from one section of the archipelago to another, and the contact between the scout soldier and the adjacent population is close and constant. Beriberi is at all times present among the civilian natives, and no effort is made to isolate the sick. Until the calendar year 1910, beriberi was a scourge to the Philippine Scouts. The total annual admissions from this cause ranged from a minimum of 115 to a maximum of 618, and there was a considerable death rate and many discharges from the service for permanent disability. In spite of six years of vigorous effort to suppress the disease, a climax was reached in 1908 and 1909, when the total admissions for

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beriberi reached 618 and 558, respectively. During 1910 certain changes in the dietary of the native soldiers were inaugurated, and in that year the beriberi admissions dropped to fifty. In 1911 there were three admissions, in 1912 two, in 1913 none and in 1914 only one up to July 30, when last reports were received.

During the years prior to 1910, beriberi among the scouts had been combated mainly on the assumption that the disease was infectious.

The opponents of the deficiency theory of beriberi have perhaps had their case strengthened by the fact that the majority of the advocates of the theory have carried out their practical work for the most part in the orient, and have dwelt almost entirely on polished rice as a factor in the etiology of the disease. In the orient rice is, indeed, the factor of importance. In other lands, where rice is little used, the case is quite different. The two following points have received insufficient attention from certain writers;

1. *Many articles of diet, other than rice, are relatively deficient in neuritis preventing vitamins.* Among these may be mentioned fine wheat flour, wheat bread, macaroni, "ship biscuit," sago, hominy, cornstarch, various breakfast foods, and possibly potatoes, exclusive use of these substances leads to polyneuritis gallinarum.

2. *Exposing food to a temperature above a certain point decomposes the neuritis-preventing vitamins present.* It was first shown by Eijkman, and has been abundantly confirmed, that a temperature of 120 C. destroyed some substance in undermilled rice, barley and rye, with the result that multiple neuritis developed when these foodstuffs were used as exclusive articles of diet for fowls. In a neuritis-preventing extract of rice polishings it was found in Manila that boiling, when prolonged for many hours, destroyed some or all of the vitamins present. It is probable that the process of sterilizing necessary for the preservation of canned goods, such as meat, beans and peas, destroys the beriberi-preventing elements originally present. It is well known that the vitamin necessary to prevent infantile scorbutus is destroyed by a temperature at or even below the boiling point, but the substances which avert beriberi appear to be somewhat more resistant to heat.

Therefore when confronted by a syndrome suggesting beriberi it is unsafe to assume that the condition is not due to a vitamin starvation until the dietary has been studied most carefully, and from a point of view entirely different from that occupied a few years ago. Mere dependence on proper amounts of fats, proteins, carbohydrates and salts is not sufficient. One must learn, by animal experiments if necessary, whether the essential components of the ration contain vitamins in quantities adequate to maintain nerve nutrition. It must further be determined whether or not vitamins, originally present in the various articles, are being in part or in whole decomposed by the culinary processes employed. Attention to these points will probably explain the occasional outbreaks of beriberi in lands where the disease is not endemic and where rice is not a food staple.

Furthermore, it is important to remember that beef (and possibly many other articles not yet studied) contains enough vitamins to prevent the development of neuritis, when fed exclusively to fowls, yet the quantity present is relatively small when compared with that amount found in beans, peas, mungos, barley, peanuts, yeast, or the bran (polishings) of rice or wheat. Therefore if the chief components of the ration are greatly deficient in neuritis-preventing substances the addition to the dietary of a small amount of meat will not supply sufficient vitamin to prevent the onset of disease.

Dr. Joseph A. Andrews, stationed at Indian Harbor, Labrador, for the Grenfell Mission, who returned recently is reported to have found the natives of

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that place suffering from beriberi as a consequence of living chiefly on white bread. When they substituted brown or black bread the epidemic ceased.

Enteric Fever.—The *British Medical Journal* in an article dated January 1, 1916, on the results of anti-typhoid vaccination in the French Army states:—

Dr. Jules Courtmont, who is in charge of the isolation hospitals of the XIV District (French military administration), has issued an interesting report on the results of antityphoid vaccination from August 2, 1914, to July 1, 1915. Haemoculture was employed for diagnostic purposes wherever possible, as it was recognized to be the only really trustworthy guide to the nature of the infection. The cases observed, in fact, included a large proportion of infections by paratyphoid organisms.

The total number of admissions of patients diagnosed to be suffering from typhoid fever was 1,347; of this number 891 had not been vaccinated, and 256 had been inoculated from one to four times with Vincent's non-poly-valent vaccine; of the 891 unvaccinated, 506 came from the front and 385 from the XIV district; of the 256 vaccinated, 96 came from the front and 160 from the XIV district.

The number of deaths among the 891 unvaccinated was 155 (17·4 per cent); of these, 80 were from the front and 75 from the district. There were only 8 deaths among the 256 vaccinated (6 from the front and 2 from the district). If the subjects who received the regulation four inoculations were accepted as vaccinated the percentage of deaths would only be 1·9. The following is the complete table:—

Admissions.	Total.	Front.	XIV District.	Slight Fever.	Medium Fever.	Grave Fever.	Deaths.
1 injection	51	19	32	35	12	4	3
2 injections.....	50	25	25	36	10	4	2
3 injections	39	20	19	24	13	2	1
4 injections.....	116	32	84	85	29	2	2
Total	256	96	160	180	64	12	8

This gives:—

	Deaths.
Non-vaccinated.....	17·4 per cent.
Vaccinated—	
1 injection.....	6·0 “
2 injections.....	4·0 “
3 “	2·5 “
4 “	1·9 “

From the bacteriological point of view the proportion of paratyphoid was high. Haemoculture was used in 100 cases of the vaccinated, and proved negative in 25 and positive in 75. Of the 75 positive cases, 3 yielded Eberth's bacillus (2 of these had only had a single injection, and of these 1 died, the third had 2 injections); 71 yielded paratyphoid B and 1 paratyphoid A. Of the 116 infected patients who had received the four injections 63 showed paratyphoid B.

Antityphoid vaccination is thus shown to be unquestionably active and efficacious, but these figures point to the desirability of making use of a poly-valent vaccine (Eberth, paratyphoid A and B).

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The *Canadian Public Health Journal* has the following:—

It is impossible to give too much publicity to the wonderful work done by the R.A.M.C., not only in fighting disease, but also in the carrying out of preventive measures. In two instances last week Mr. Tennant gave replies to questions upon the health of the forces, and both were eminently satisfactory. With regard to the troops on Salisbury Plain, he said: The annual ratios per 1,000 are, during the period September 1 to December 31: Admissions, 325.4; deaths, 1.88. Both these ratios are lower than those for peace time. With such a record he was perfectly justified in refusing the request for a committee to inquire "into the health of the troops." The other question was the perennial one on enteric fever and inoculation. The reply was as follows: "In the period from the commencement of hostilities to November 10, 1,365 cases of enteric fever were reported as having occurred amongst the British troops in France and Belgium; of these 1,150 cases have been definitely diagnosed after bacteriological examination. In 570 cases where there had been inoculation there were 35 deaths, and in 571 cases where there had not been inoculation there were 115 deaths. In the United Kingdom from August 1, 1914, to October 30, 1915, 540 cases of enteric fever were reported and 87 deaths; 39 per cent of these cases occurred in men who had not been inoculated, but I cannot say how the deaths were distributed amongst the inoculated and uninoculated respectively. For paratyphoid no system of inoculation has yet been adopted." This evidence is absolutely conclusive to all, except a few cranks. But "if an angel from heaven came" they would still be unconvinced.

The Research Defence Society issued a leaflet on protection against typhoid fever about fifteen months ago; it has now added a statement, dated January, 1916, in which it reported as follows:

Among our Expeditionary Force in France and Belgium about 95 per cent have been protected against typhoid fever, the annual average being about 90 per cent.

The annual admission ratio per 1,000 is more than nine times greater among the non-protected than among the protected. Among the non-protected it is 9.1 per 1,000. Among the protected it is 1 per 1,000. The death rate is thirty-one times greater. Among the non-protected it is 1.84 per 1,000. Among the protected it is 0.66 per 1,000.

The figures for Gallipoli have not yet been thoroughly analysed and criticised, but they leave no room to doubt the value of the protective treatment.

The addendum also deals with the suggestion that the statistics are worthless because typhoid fever and para-typhoid fever are often confused. The leaflet points out that this suggestion is false.

If the cases of paratyphoid fever are added to the cases of typhoid fever the annual admission among the non-protected is 11.3 per 1,000. Among the protected it is 3 per 1,000. The death ratio among the non-protected is 1.90 per 1,000. Among the protected it is 0.09 per 1,000.

Trench Fever.—A new infectious disease? It would be difficult to make the well-informed clinician believe that he could encounter a number of cases of disease presenting the same syndrome which he would be unable to identify and which, moreover, could not be classified even when the best professional advice was secured. And yet this is happening now among the soldiers in northern France, according to the *British Medical Journal* for July 15. For the past three months there have been observed numerous cases of a disorder somewhat like subacute nephritis in its manifestations. Dropsy is sometimes present and the urine contains albumen and casts. It does not appear to be infectious or contagious and the medical authorities have been unable as yet to determine what are the predisposing causes. Naturally there

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has been a great deal of theorizing. One explanation was that it was an Oriental disease, something on the order of beriberi, but this theory was discounted by the fact that it was not prevalent among the Indian troops. Moreover, as has been proven by Heiser and others in the Philippines, beriberi is dietetic in origin and the soldiers suffering from this strange malady have been shown to have had the same fare as the others. A suggestion which obtained some favour for a time was that these were cases of unrecognized scarlatina, but this has since been disproved. Some observers hold that it is an auto-intoxication due to the intestinal stasis which necessarily develops when men are subjected to prolonged periods of duty in the trenches and elsewhere. Some authorities saw features in it analogous to forms of metallic poisoning, and with this idea in view have made searching analyses of the food, water, and the patients' urine. Whatever may be the causes of this new disease, it does not seem to be very serious except in its temporarily incapacitating effects, and it is probable that a further period of observation will clear up its etiology.

Captain McNee and Lieutenant Renshaw, with the clinical assistance of Captain Brunt, all of the R.A.M.C., have published an article on "Trench Fever" in the *British Medical Journal* of February 12, 1916:—

During the whole time that the army has been in Flanders cases of short fever have continually occurred.

In a comparatively small number there has been a little bronchitis, or some diarrhœa, or tenderness of the muscles or nerves in limited situations, these have been called bronchitis, or influenza, enteritis, colitis, myalgia, and neuritis. But, as a rule, the symptoms have not included more than the general aches and pains which are the common denominator of all fevers. The patients have been very slightly ill, and except in a small number of cases have quickly returned to duty.

It has been very difficult to know what to call these cases. They have been sent in as influenza, myalgia, neuritis, pyrexia of unknown origin, and even as rheumatic fever. Of genuine rheumatic fever I have seen only five instances. Its absence has been one of the most striking things in the campaign, and effectually disposes of any connection between this fever and wet or cold.

These undetermined fevers have from the first been the hunting ground of the bacteriologists, who with their laboratories are disposed in a line along the front, together with a few in special places further back. The bases have, of course, their own bacteriologists, and are not now under consideration.

The diagnosis of the enteric group of fevers is of such consequence to an army that the first task of the bacteriologist is always to exclude them. In consequence these cases of pyrexia have throughout been examined from that point of view. As they were usually seen quite early in the disease cultivation of the excreta and agglutination tests have also been carried out in many hundreds of cases. In any case where either abdominal symptoms, or a dry tongue, or an enlarged spleen, or suspicious spots, gave clinical grounds for suspecting an enteric fever, the patient was sent down as "suspected typhoid" even if this had been done we were left with a large mass of cases in which neither the clinical nor the bacteriological evidence afforded any ground for this diagnosis.

In the early part of the summer Major J. H. P. Graham called my attention to a type of fever characterized by two bouts of pyrexia separated by a normal interval. He afterwards published two cases of the kind. About the same time Captain Wells reported several similar cases. Colonel Sir William Leishman came round with me to see these cases. Their resemblance to sand-fly fever and also to dengue struck those who had had experience in these fevers,

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but there were several points which effectually disproved identity. Other officers were good enough to look out for similar cases. I should like especially to thank Captain Stirling and Captain Bolus for their help. In the *Lancet* of November 20, 1915, appeared a paper by Captain G. H. Hunt and Major A. C. Rankin, describing 30 cases and mentioning for the first time the name "trench fever," which by this time has come into common use. From these papers and from the paper now published I think we can say that from the mass of cases of obscure fevers one type has been isolated in which the clinical symptoms, the course, and to a certain extent the pathology, have been established. We are, however, still ignorant both of the nature of the infection and of the way in which it is introduced into the human system. It is still occurring, and this renders the agency of a flying insect improbable, though I was shown *A. maculipennis* only two days ago (January 29).

The present paper needs no praise of mine, but I may say that I have followed the work throughout with the deepest interest.

The cases of the type to be described first began to be recognized in this laboratory area about the beginning of July, 1915, although, on considering the matter later, it was certain that a small number of men seen during the previous month had suffered from the same disease.

It will be of interest to give an account of how our attention was drawn to the condition in the first place. In the first few days of July a number of men, about twenty in all, were sent in to an isolation hospital labelled "suspected enteric." These men all belonged to a division which had recently arrived in the area, and all had headache and varying degrees of pyrexia, in addition to other symptoms to which less attention was paid at the time. Since it was known that during the previous two months cases of paratyphoid B had occurred both in the civilian population and in the division then in occupation of the area, it was at first thought that these new cases might be of the same nature. Blood cultures were made in bile salt broth in the usual way, and thereafter the cases were immediately transferred to a stationary hospital further from the front. These blood cultures proved one and all sterile. The men reached the statutory hospital within a week of the onset of the febrile symptoms, but, on admission there, their temperatures were either found normal or fell to normal within a day or two, leaving the patients apparently quite well. As the cases did not resemble clinically any of the enteric group, an inquiry was at once addressed to this laboratory to find out the results of the blood examinations. The bacteriological and clinical findings seemed to exclude the enteric group, although the possibility of previous inoculation modifying the course of genuine enteric had still to be considered at the time.

Cases of the same kind occurred immediately afterwards, and on these being watched it was found that the fever ceased after five to eight days. These men were examined carefully, and other symptoms recognized, which will be described in full later on. None of these early cases, however, remained under observation for long after the temperature fell to normal, so that their subsequent history is unknown. The point of this remark will be seen when the course of cases watched over a long period is considered.

As has been already indicated, all the early cases remained under suspicion of belonging in some sort of way to the enteric group. As more and more cases were observed, however, each with a similar and constant group of symptoms, the disease soon became recognizable as a definite clinical entity, and early became known to officers and men under the name "trench fever."

Since attention was attracted to the condition, great numbers of cases have come under observation. During the months of July, August, and September

ber, in fact, it was impossible to visit three or four field ambulances on any day without seeing at least half a dozen fresh cases.

During August and September arrangements were made, especially at one casualty clearing station, to keep a series of cases under constant observation for some weeks, and it is as a result of this that we have been able to carry out most of the clinical, pathological, and experimental work detailed below.

1. The disease is a definite entity, and of infective nature, as is proved by its ready transmission from one person to another by the blood.

2. There are two clinical types of the disease: (a) A short fever of about a week's duration, followed frequently after a few days by a short single relapse; (b) a longer illness characterized above all by the number, sharpness, and periodicity of the relapses.

3. The symptoms of both types are clinically identical, the most constant and characteristic being headache, and pain in the legs and small of the back.

4. The two types described are, in our opinion, merely varieties of one and the same disease. In addition to the identity of symptoms, the experimental evidence for this is strong, a typical "short" variety having been shown capable of giving rise to a typical "long" one.

5. The incubation period varies, possibly with the dose of the infective virus introduced. The shortest incubation period in our experimental transmissions was six days, and the longest twenty-two days.

6. The disease is transmissible in every case by the whole blood, whether injected intravenously or intramuscularly.

7. The disease is not transmissible by the serum. In the one instance in which the serum proved infective, haemolysis of corpuscles had occurred before injection.

8. It follows as a corollary to the preceding statement that the virus is not a "filter passer" in the serum, as we thought from analogy that it might be. All our experiments with filtered serum were negative.

9. The plasma was infective in one experiment, but haemolysis of red cells had occurred, so that the plasma was haemoglobin tinted. The filtered plasma in another test was not infective.

10. The above results seemed to point to the virus being contained *within the blood corpuscles themselves*, whether leucocytes or red cells.

11. Blood corpuscles, after washing five times in saline to remove the plasma, were still found to be infective. This further supports our view that the virus is intracorpuseular.

12. Very many blood films at all stages of the disease have been examined without a parasite being detected. The blood has been examined fresh, under dark-ground illumination, and dried films have been stained in varying ways, without result.

13. Blood corpuscles were broken down, and the haemoglobin-tinted fluid passed through a filter in an attempt to prove the virus an ultra-microscopic one confined to the corpuscles. The fluid when injected, however, was not found to be infective.

14. The only constant morphological change in the blood is the presence of punctate basophilia. This was so marked in some cases as to require very careful investigation to differentiate it from an intracellular parasite. The blood counts, differential and ordinary, did not yield any important results.

15. As regards the means by which the disease is transmitted in nature we have as yet no evidence to offer. The fact that only two classes of men are affected—those from the trench zone and men of the Royal Army Medical Corps—is, however, suggestive. The disease is either contagious from man to man or, what seems much more likely, is carried by one of the common

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flies or paracites found in the trenches. During the past summer lice, mosquitoes, midges, and flies of other kinds have all been common in the Flanders war zone.

International Frontier Quarantine.—At the date of the last annual report this inspection was in force, on account of smallpox in North Dakota and Minnesota, U.S.A., at Gretna, Man., and Emo, Fort Francis and Rainy River, Ont. It was raised by you at all four places on June 15.

Electrolytic Hypochloride for Hospital Ships.—Last month a report to the Medical Research Committee on the use of sodium hypochlorite prepared by the electrolysis of sea water for disinfecting and antiseptic purposes on shipboard, especially in hospital ships, has been made by Drs. H. D. Dakin and H.G. Carlisle, and will be read with much interest, because it is important both in its scientific and practical aspects. The report mentions the well-known Hermite process for the sterilization of sewage by electrolytic hypochlorite, introduced about 1893, and the use of electrolytic hypochloride for general disinfection by several sanitary authorities, notably at Poplar, and the valuable results obtained through its use in the plague epidemic in Glasgow in 1901.

This Hermite process was reported on by me in my annual report October 31, 1894, to the then Minister of Agriculture, with a recommendation for its use on seagoing passenger vessels.

Circulars.—Circular letters were issued from time to time to your different officers, calling their attention to the various matters during the year connected with the appearances of epidemic diseases abroad.

Bulletins, etc., received.—The weekly Public Health Reports of the United States Public Health Service have been regularly received and are of great value, as are also the monthly bulletin from provincial, state, and municipal boards of health in Canada, the United States, and other countries. The bulletins of the International Office of Public Health, Paris, and of the Sleeping Sickness Bureau, London, have been regularly received throughout the year, and in both cases spare copies have been distributed to the provincial boards of health.

Official Visits, Inspection, etc.—On the 19th June last I left, by your instruction, to inspect on the Atlantic coast. I visited the quarantine station at Grosse Isle, Que.; the leper lazaretto at Tracadie, N.B.; the quarantine stations at Chatham and St. John, N.B., Digby, Halifax, Sydney, and Louisburg, N.S., Charlottetown and Summerside, P.E.I.; Rimouski, Que.; and made a second inspection at Grosse Isle, Que., in connection with the improvements being carried on there.

On August 17, I left for the Pacific coast. I inspected at Vancouver, Victoria, William Head, and Prince Rupert, and the leper lazaretto at Darcy island.

No meeting of the Canadian Medical Association was held this year, owing to the absence of so many medical men on military duty.

The Canadian Public Health Association held its annual meeting in Toronto on the 3rd and 4th of September.

I had the honour to represent you at the annual meeting of the American Public Health Association held in Rochester, N.Y., September 6 to 10. This association includes the United States of America, the Dominion of Canada, the Republic of Mexico, and the Republic of Cuba. The attendance including the New York State Sanitary Officers' Association, was close to 2,000.

An address of welcome was given by Governor Whitman of New York state. Of this address a recent writer says:

As a significant sign of the times we might well refer to the address of Governor Whitman of New York state. It represented the attitude of a broad-minded state executive toward the public health movement of to-day.

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Governor Whitman pointed out that "public health is only one of many fields of public work which are growing and expanding year by year, and demanding constantly larger appropriations which they are able to justify by valid evidence of excellent results attained. Meanwhile, city and state debts and tax rates are mounting to an unprecedented degree." Yet he concluded that "public health is one of the social activities of the state whose development should be curtailed only in the very last necessity." After a keen and incisive review of the more important phases of the public health campaign—in relation to infant mortality, communicable diseases, tuberculosis and the diseases of later life—Governor Whitman points out as a justification of public health work, even on economic grounds, that the reduction in the New York state death-rate of 0.4 per 1,000 in 1914, as compared to 1913, corresponds to a saving of 4,000 lives which, taking the ordinary estimate of \$5,000 for the average value of a human life, "means an economic saving of \$20,000,000 due to progressive health work in a single year."

Most inspiring of all is the Governor's attitude toward the integrity of the public health service and its freedom from political control.

Finally, those who have watched the admirable results of the system of state health organization through a corps of district sanitary supervisors in force for two years in New York state will welcome the Governor's cordial approval of the plan as "most important and beneficial to the local communities." He adds, "I sincerely hope that some means may be found by which the services of these physicians may be retained, and feel confident that next year, when the members of the legislature are made fully acquainted with the facts as to the value of these services, funds will be provided for their continuance. I shall use my influence to attain this end, for, while rigid economy in the administration of the finances of the state is essential, savings in expenditure attained through decreased efficiency in health work are not only unwise but resolve themselves, in the end, into irreparable waste of the most valuable resources of the Commonwealth."

At this meeting of the Association, of which I have been a member since 1887, and of which I am a past-president, I had the honour to be elected an honorary member. Others who received a like honour at the same time were Dr. Stephen Smith, the first president of the Association in 1872, 1873 and 1874; General Gorgas of Panama Canal fame, General Sternberg, the Bacteriologist, and Dr. Henry Holton of Vermont.

On the 6th of this month I was delegated by you to attend a meeting at Washington, D.C., of the International Joint Commission of the Pollution of Boundary Waters. The meetings were held on the 8th and 9th.

The *Journal of the American Medical Association* speaks of this meeting as follows:—

The International Joint Commission held a meeting at Washington, D.C., March 8 and 9, to consider the final report on the engineering investigations which have been made during the past year relative to the pollution of boundary waters. The commission is composed of three members from the Dominion of Canada and three from the United States. It is formed as a permanent tribunal for the adjustment of boundary matters between the two countries under the terms of the treaty of January 11, 1909, between the United States and Great Britain. The commission has from time to time considered various matters relative to water power, water diversion and obstruction to navigation, including the adjustment and control of lake levels, and has also during the past three years been considering the matter of pollution of boundary waters.

The treaty referred to states that "the waters therein defined as boundary waters and the waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other." In 1913 a reference comprising two

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branches was submitted to this commission whereby it was asked to determine in brief, first, whether the treaty obligations were being violated and if so, at what points and to what extent and by what causes, and, secondly, what remedies would be feasible and advisable under the circumstances. The first branch of the reference was answered by the commission in a progress report dated January 10, 1914, embodying the report of the sanitary experts. Of the latter, Dr. Allan J. McLaughlin, United States Public Health Service, had been appointed chief sanitary expert, and with him was associated Drs. J. W. McCullough and John A. Amyot, and Fred A. Dallyn, all of the Provincial Board of Health of Ontario. In brief, it was found that the provisions of the treaty were seriously violated, and that public health was endangered at many points, particularly on the boundary rivers. The waters of the Great Lakes themselves, from an international standpoint, were found to be satisfactorily pure, existing pollution being confined to the shore fronts.

The second branch of the reference was essentially engineering, and its solution was placed in the hands of Prof. Earl B. Phelps as consulting sanitary engineer. Engineering offices were opened at Detroit and Buffalo in charge of Mr. Henry C. McRae and Mr. Frank C. Tolles, respectively, and during the past year comprehensive drainage and disposal schemes have been developed for these two cities and for all the smaller communities on both sides of the St. Clair, Detroit and Niagara rivers. The final report on this work has just been completed, and is now in course of publication. The meeting of the commission referred to was for the purpose of hearing and discussing this report. The general conclusions and recommendations of the report have not been accepted by the commission, and will not be until all the interested communities, as well as the state and federal representatives of the two governments have had opportunity to review the findings and to be heard relative thereto.

Not only does this international commission represent a unique and, by contrast with other existing methods, an eminently satisfactory method of dealing with international affairs, but also the findings of the commission in the particular case in question promise to point the way toward a more systematic and consistent policy of the control of stream pollution than has heretofore been possible under existing methods of state control.

Changes in Medical Staff (temporary).—With your approval Dr. V. N. Mackay, Assistant Medical Officer and Bacteriologist of the Halifax Quarantine Service, and Dr. Warwick, assistant Medical Officer of the St. John, N.B., Quarantine Service were given leave of absence to join the Military Medical Service for active duty. The place of Dr. Mackay has been filled by the temporary appointment of Dr. A. E. Blackett of Halifax. Dr. Warwick's place was filled for the winter by the transfer to St. John of Dr. Heagerty from the Grosse Isle Station, where navigation was temporarily suspended.

Statistics, etc.—Grossa Isle, Que.—Visitors inspected 344, being a decrease of 40 as compared with last year, and at the substation of Rimouski 40, being a decrease of 20 from last year's figures. Persons inspected at Grosse Isle 97,057, at Rimouski 56,279, a total of 153,336, as against 149,598 last year, a decrease of 36,262, due to the limited immigration owing to the war.

Infectious disease was reported or discovered on 23 occasions. The cases and contacts were landed at Grosse Isle.

Seventy-nine persons were admitted to hospital. The diseases were measles, varicella, mumps, enteric fever, and diphtheria. No one of these cases proved fatal. The admissions to hospital in 1914 were 502. In 1913 they were 1,520. With the large immigration to be expected after the war, the admissions may again well reach, or exceed the figure of 1913. It is therefore of urgent importance that the building of the new hospital which has been begun be pushed rapidly to its completion.

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Halifax, N.S.—Vessels inspected 274. Persons inspected 19,357. This was 49,471 less than in the preceding year. No quarantinable disease presented itself, and there was no admission to hospital for such disease.

St. John, N.B.—Vessels inspected 272. Persons inspected 23,877. Admissions to hospital 3; one case each of diphtheria, scarlet fever and enteric fever.

The pressing need of a deep water wharf makes itself more and more felt as each year's dredging of the harbour increases the rapidity and strength of the current. It is extremely dangerous to lighter to and from the quarantine boat in rough weather. Several times this winter a boat accident has been narrowly escaped. Apart from the risk to the staff an accident in landing passengers would be an extremely serious matter.

Chatham, N.B.—Vessels inspected 109. Persons inspected 1,143. No quarantinable disease.

Digby, N.S.—No quarantinable vessels entered the Annapolis Basin this year.

Sydney, N.S.—Vessels inspected 248. Persons inspected 11,033. No quarantinable disease.

Louisburg, N.S.—Vessels inspected 112. Persons inspected 2,985. No quarantinable disease.

Charlottetown, P.E.I.—Vessels inspected, 8. Persons inspected, 91. No quarantinable disease.

Summerside, P.E.I.—No quarantinable vessels entered this port during the year.

William Head, B.C.—Vessels inspected 174. Persons inspected 26,754. The ss. "*Titan*" is in quarantine with a case of smallpox. Her passengers 74 in number have been landed. The ship is from Yokohama.

An improved water supply is most pressingly required. It is quite inadequate for domestic purposes, and still more so in case of a fire such as so closely threatened the station last summer.

Victoria, B.C.—No quarantinable vessels entered this port during the year.

Vancouver, B.C.—No quarantinable vessels entered this port during the year.

Prince Rupert, B.C.—No quarantinable disease. A fresh-water supply is pressingly needed. Also a disinfection building. There is, as yet no provision made for handling an infected vessel at this port.

Military occupation.—In order to help to give prominent positions in the harbours of Halifax and St. John to the militia defending the country, you allowed the military authorities to occupy with troops all the buildings at the quarantine stations of Lawlors Island and Partridge Island that could possibly be spared without entirely paralysing those stations for quarantine service.

Tracadie Leper Lazaretto, N.B.—Patients at present 15. Seven males and eight females. There were two deaths during the year, and one new patient was admitted. See under Leprosy.

The devotion and care given to the patients by the nursing religious sisters continue to be above all praise.

Darcy Island Leper Lazaretto, B.C.—The buildings at this leper lazaretto are in good repair. They have not been occupied during this year.

Public Works Health Act.—Your inspector for Eastern Canada states that the year has been an exceptional one in the almost non-appearance of contagious and infectious diseases among the men employed on the various public works coming under his inspection. He has found the medical service given to be complete. The sleeping

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quarters and boarding of the men fully equal to the very good conditions reported by him last year.

Your inspector for Western Canada reports the year as remarkable for the sudden falling off in the volume of work and number of men engaged, and in the freedom from epidemic disease.

On the Hudson Bay Railway work much of the grading work was re-sublet to stationmen who lived in small segregated parties with improvised habitations. Through antiscorbutic food was obtainable some parties fed themselves so poorly on unvaried diet and indifferent cooking that numerous cases of scurvy developed. The trouble was eliminated by using pressure on the employees to have them eat more vegetables and fruit.

I have the honour to be, Sir,

Your obedient servant,

F. MONTIZAMBERT, M.D.

Director-General of Public Health.

The Honourable,
The Minister of Agriculture.
Ottawa.

MISCELLANEOUS

EXHIBITIONS.

APPENDIX No. 2.

SAN DIEGO, CAL., April 1, 1916.

SIR,—I have the honour to submit the following report of the operations of the Exhibition Branch of your Department for the fiscal year ended March 31, 1916:—

PANAMA PACIFIC INTERNATIONAL EXPOSITION, SAN FRANCISCO.

The greatest part of the fiscal year 1915-16 was spent at the Panama Pacific International Exposition, held at San Francisco, California, from February 20 to December 4, 1915, where, according to your instructions, we endeavoured to make our participation one of great magnitude that would surpass all our previous efforts. My report on the operations of this branch for the year 1914-15 affords detailed information as to the extent and importance of our participation in San Francisco and the results obtained up to the 31st of March, 1915. The great success of our exhibit during the first weeks continued unabated during the whole length of the Exposition. The Canadian Pavilion was recognized by all to be the most attractive building on the Exposition grounds, and the press and visitors were unanimous in giving Canada credit for being the foremost country in the world in the art of exhibiting and advertising her resources.

The attendance at the Panama Pacific International Exposition, San Francisco, totalled nearly 19,000,000, and practically all the visitors passed through our building. All the staff was kept busy answering inquiries from visitors from all parts of the United States regarding Canada, especially the farm lands of the Northwest, where a great many expressed their desire to go and settle. Another gratifying feature was the fact that our exhibit was visited by a large number of Canadians who were loud in their praise for what the Canadian Government was doing to advertise the country, expressing at the same time their satisfaction at our fine exposition.

A large quantity of Atlases and other publications issued by the Federal and Provincial Governments have been distributed during the year. This literature affords a thorough knowledge of Canada's resources, and deals especially with the adaptability of our soil and climate for agricultural purposes, and the opportunities offered for the safe investment of capital in our forest and mineral wealth. I have no doubt that Canada will derive great benefit through making such an extensive and comprehensive exhibit in California.

PANAMA CALIFORNIA INTERNATIONAL EXPOSITION, SAN DIEGO, 1916.

The Canadian Government having decided to take part in the Panama California International Exposition held in San Diego, California, during 1916, the exhibits shown in the Canadian Pavilion at San Francisco in 1915 have been transported to San Diego and are now installed in one of the finest buildings on the Exposition grounds, which has been placed at our disposal, free of charge, by the executive of the exposition. It is situated on the main thoroughfare of the grounds, near the main entrance. Its dimensions and construction were such as to allow the rapid and

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successful installation of the whole of our exhibit, at a comparatively low cost. As in San Francisco our display includes products of agriculture, horticulture, forestry, minerals, fish and game, and relief maps of our water-powers. Panoramas and pictures of all kinds illustrate the progress of colonization in Canada, as well as transportation facilities, especially in connection with the requirements of the Northwest grain crops. Our display of fresh and bottled fruit and our mineral exhibit can without hesitation be called unique. Special attention is also given to the distribution of Government literature and to the operating of our Information Bureau.

Although the transference of our exhibits from San Francisco to San Diego was considerably hampered and delayed by the unusual stormy weather experienced in Southern California at the beginning of this year, we succeeded in having our Building opened to the public on the 15th of February, three days before the official opening of the Exposition. The papers are again publishing most complimentary reports about our participation, and our Building has already been visited by thousands and thousands of people from all parts of the United States. The Panama California International Exposition is extensively advertised all over the United States, our exhibit being mentioned as one of the main features. Special rates from all eastern parts have been arranged with the railroads, and the management fully expects that the number of visitors to the exposition will by far exceed the two millions that passed through the gates last year. In this respect I may say that their expectations will be fully realized if the attendance in the future continues to be as large as it has been since the opening day, and as our exhibit is given as being quite as complete and effective as in San Francisco, I have no doubt that the best results will be achieved for Canada here.

I may add that the management of the Exposition, realizing the great importance of the Canadian exhibit as a drawing card, not only placed at our disposal, free of charge, the magnificent building in which our exhibit is now installed, but also assumed to meet all expenses in connection with the transfer of our goods from our building in San Francisco to the Exposition grounds here, and the supplying of water, gas, electric current and guards, thus bringing down to a considerable extent the cost of our participation.

The whole respectfully submitted.

WM. HUTCHISON,

Canadian Exhibition Commissioner.

To the Honourable,
The Minister of Agriculture,
Ottawa.

